

Motor Cycling

VOL. XV

TUESDAY, 26TH DECEMBER, 1916.
Registered at the G.P.O. as a Newspaper.

No. 372.

B.S.A. MOTOR BICYCLES

*Despatch
Carrying
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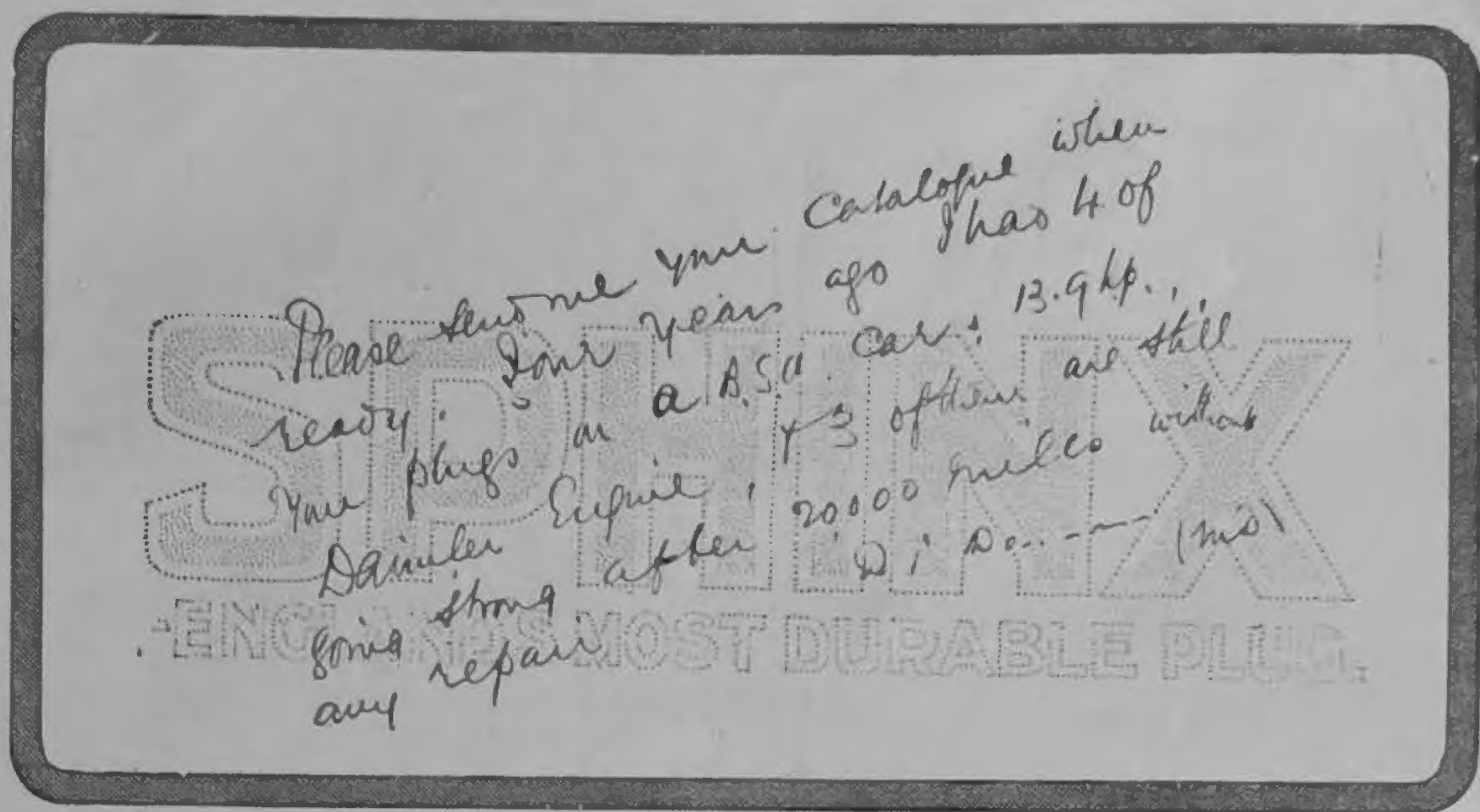
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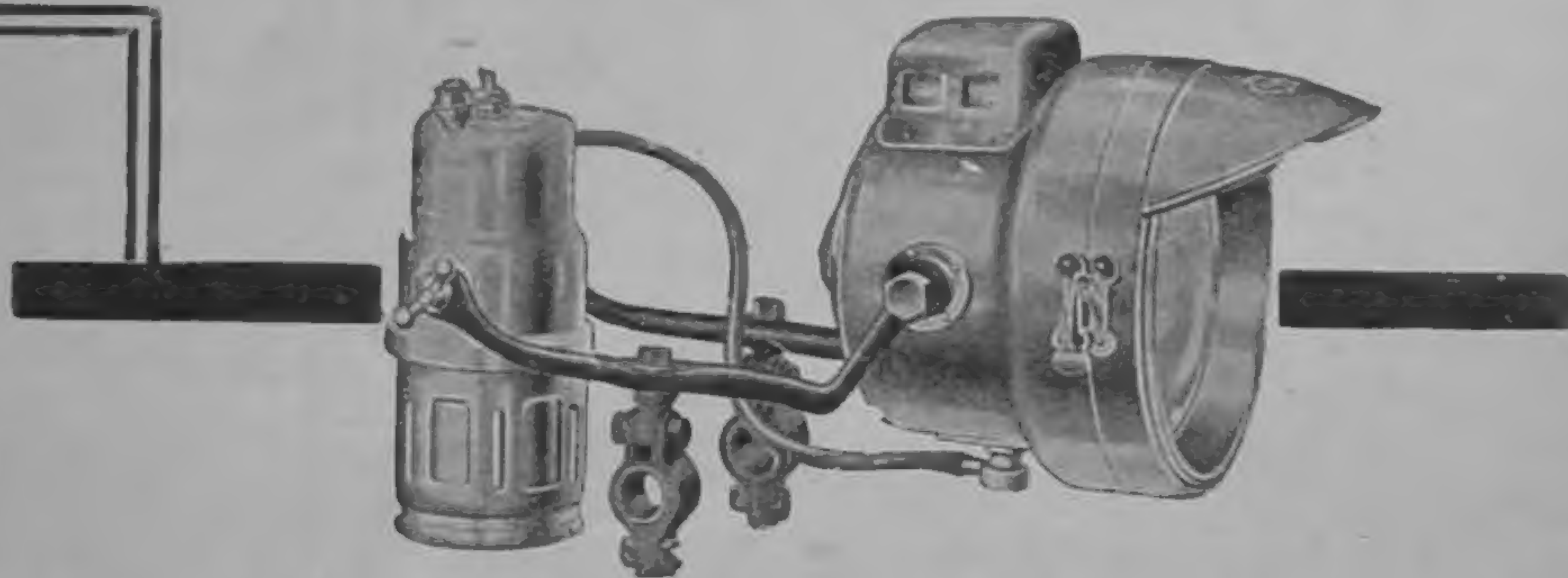
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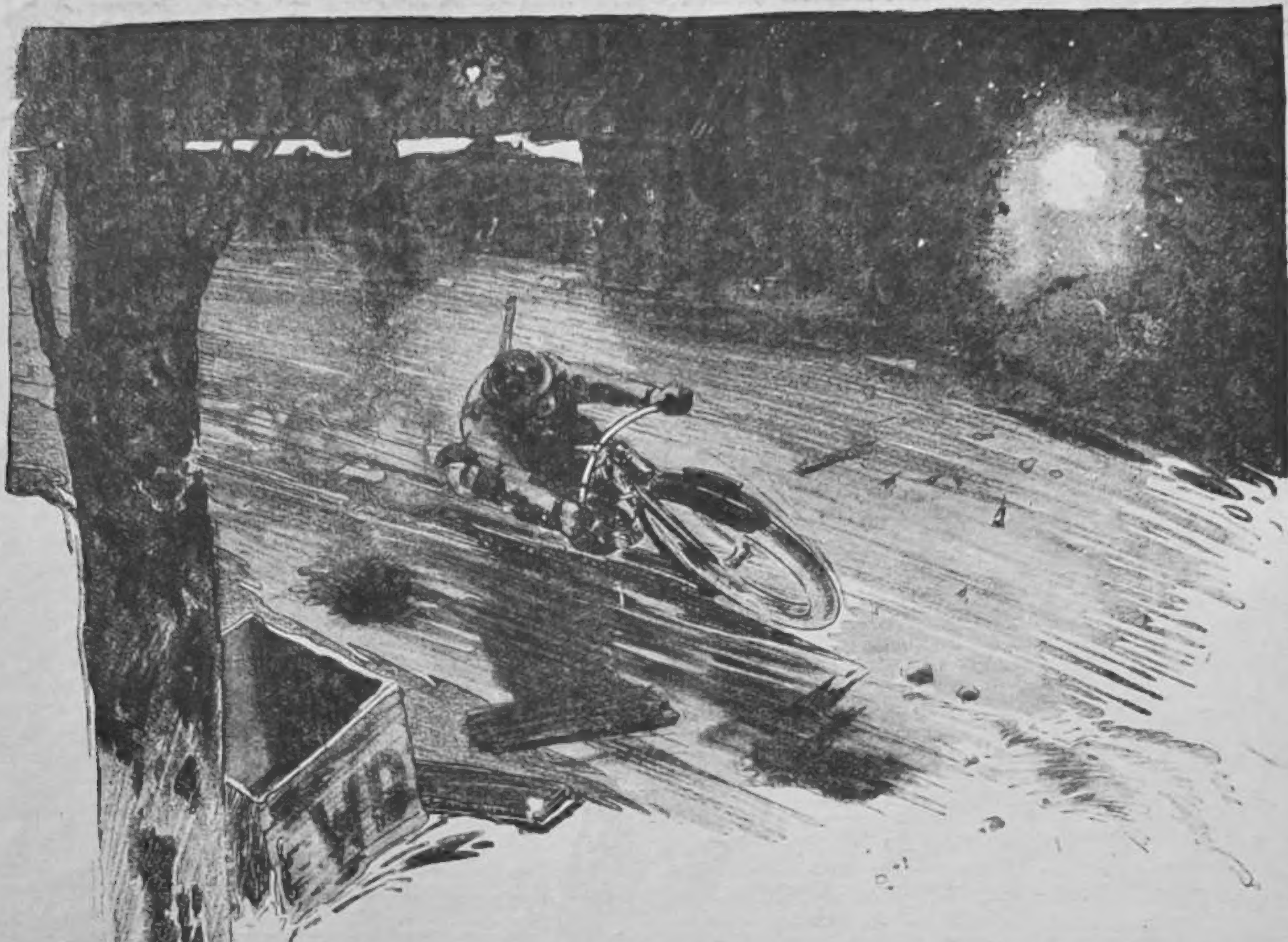
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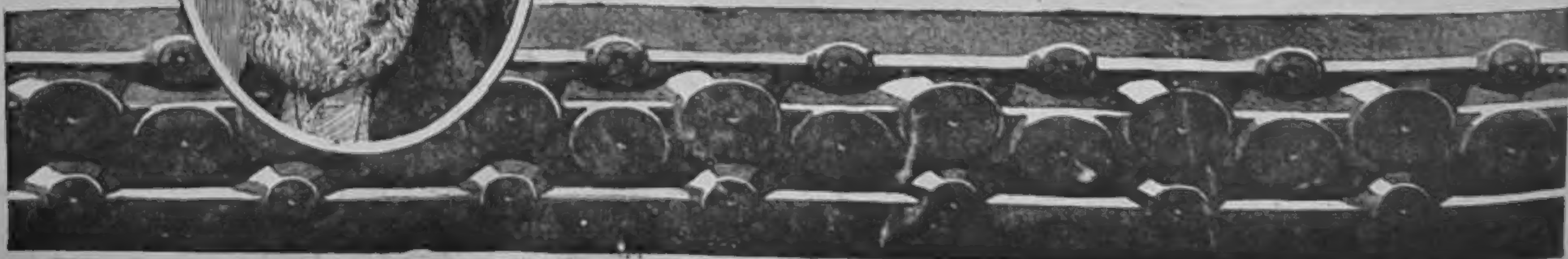
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It's a muddy road and a bloody road,
And a road that's swept by fire,
But we've got to get through with the Orders 'bus
Or we'll raise the C.O.'s ire.

So you'll hold at the bend, I know, old girl,
You'll stick it and turn not a hair,
Just one more dash! Through one more splash!
And we're there, old girl, we're there!

ERNEST
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The Dunlop rubber-budded non-skid motor-cycle cover.

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MotorCycling

A Newspaper for Motorcyclists only

Edited, Written, and Illustrated
by

A STAFF OF
PRACTICAL
MOTORCYCLISTS.

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EDITORIAL

AT the present time it is rather difficult to appreciate the influence of the proposed measure which will enforce every man not employed on work of national importance to take up that work, on the motorcycle industry as it stands at the present time. At the time of writing the scheme is in a very nebulous state, but knowing, as we all do, the tremendous energy and driving power of the new Premier, we may expect that it will be a very short period before there is a severe what may be called "combing-out" of trades, the prosecution of which is not absolutely essential to the welfare of the nation. That the measure will increase the number of munition workers by many tens of thousands is an assured fact, and, naturally, those amongst them who are motorcyclists will find their machines of the utmost value to them. It is a well-known fact that in the neighbourhood of large munition centres accommodation is notoriously bad, and hence the motorcycle is of the utmost value to a man proceeding to and from his work. Instead, therefore, of there being a diminution in the number of motorcyclists on the road we fully expect that there will be a big increase, and, as we anticipated in our editorial in the last issue, there will be a growing demand for machines, both new and second-hand. Those who are in the happy position of being able to supply from stock will find, therefore, a ready market in the spring of 1917, whilst, of course, there is practically bound to be a boom in second-hand machines.

NOW that we have the official announcement with regard to the increase in the railway fares, i.e., a 50 per cent. addition, it will be even more appreciated why this prospective boom will receive an additional fillip. The commercial traveller, if he proposes to follow his usual mode of

travelling, is faced with what must amount to, when taken on a yearly basis, an almost prohibitive rate of fares, and, naturally, if the proposition is put to him in the proper way, he will undoubtedly turn to the cheapest means of motor travelling, the motorcycle and sidecar. As we pointed out last week, a neat box carrier can be accommodated on the sidecar chassis which can not only accommodate traveller's samples, but his personal luggage. It is difficult to see what better improvement a man could have on such an outfit. Inexpensive in first cost, economical and affording a means of tapping districts otherwise impossible, the commercial traveller's sidecar outfit will prove to many not only a means of solving the present traffic difficulties, but of opening fresh fields of prosperity.

ELSEWHERE in this issue a contributor deals with the subject of the use of aluminium, or, speaking more correctly, aluminium alloys, in internal-combustion power unit construction. Whilst we consider that the use of this and similar materials will undoubtedly gain popularity, we incline to the opinion that, so far as motorcycle power units are concerned, the vogue will not be so extensive as in the car world. Aluminium is very susceptible to heat, and has a high co-efficient of expansion, and therefore, taking into consideration the widely differing temperatures that pertain even during normal running of a motorcycle engine, it is reasonable to suggest that grave natural difficulties have to be overcome. With a car engine the question of overheating need not be considered owing to the water cooling. In the article in question the point is argued as to what would happen after a prolonged period of overheating, and this is certainly one that would have to be considered by those who propose to employ this material.

Aluminium in Motorcycle Engine Construction.

A Discussion on the Merits and Demerits of a Material that is Receiving Considerable Attention in the Motorcar World.

By B.Sc.

It will be remembered that when considerable attention was being given, some little while ago, to the possibilities of the use of aluminium pistons for motorcycle engines in this journal, I took up the attitude (in some "letters to the Editor") that, however fascinating the use of aluminium or, to speak more correctly, aluminium alloy, would be in motorcycle power-unit construction, there were grave difficulties to be overcome. I endeavoured to point out, and quite rightly, that in the case of a piston a clearance of about four times that allowed for when cast-iron pistons and cylinders were concerned, would be necessary.

I have again occasion to refer to this interesting subject of the increasing attention that is being given at the present time to the use of aluminium alloy in motor power-unit construction.

Since that time we have had one instance in which the use of aluminium pistons has proved satisfactory. I refer to the horizontally-opposed Matchless power unit. In this it was found that a tapered piston with a maximum clearance of 15/1000 part of an inch was proved necessary unless seizure or partial seizure was to be avoided. Now it might be argued that if aluminium was satisfactory in this case it would be successful in the ordinary single-cylinder and twin-cylinder engines. What must be borne in mind, however, is that the pistons of these two types of engines—as I have proved by actual experiment, strength reduction, etc.—receive greater strains than those employed in the horizontally-opposed engine. I have yet to hear of the successful use of aluminium in any other type of engine other than this one instance, and even in this case the results of a test of many months wear have yet to be given.*

The Possibility of Aluminium Engines.

Aluminium alloy enthusiasts have gone even further in the car world, and suggested that practically an entirely aluminium engine is a possibility. I have before me illustrations of truly remarkable castings, consisting practically of the entire engine. A liner is pressed into the cylinder and cast-iron valve seats, secured in position in order to provide a suitable bearing area for the piston, and gas-tight joint for the valves. On the other hand, however, I am aware that an engine of this type undergoing a certain test

has proved what may be termed a failure. As to the nature of the test, I cannot elaborate (it being in connection with a certain branch of H.M. Government), and, of course, I do not condemn every engine of this type through the failure of the power unit in question. Suffice to say, however, that a failure has to be registered with a unit of this design.

The differences between the co-efficient of expansion of aluminium, cast-iron and steel are natural difficulties which will require a great deal of thought and scientific experiment before they can be overcome. For instance, if we take the case of the cast-iron valve seats. Here we have a metal with a smaller co-efficient of expansion than that of aluminium. What happens, therefore? The aluminium expands away

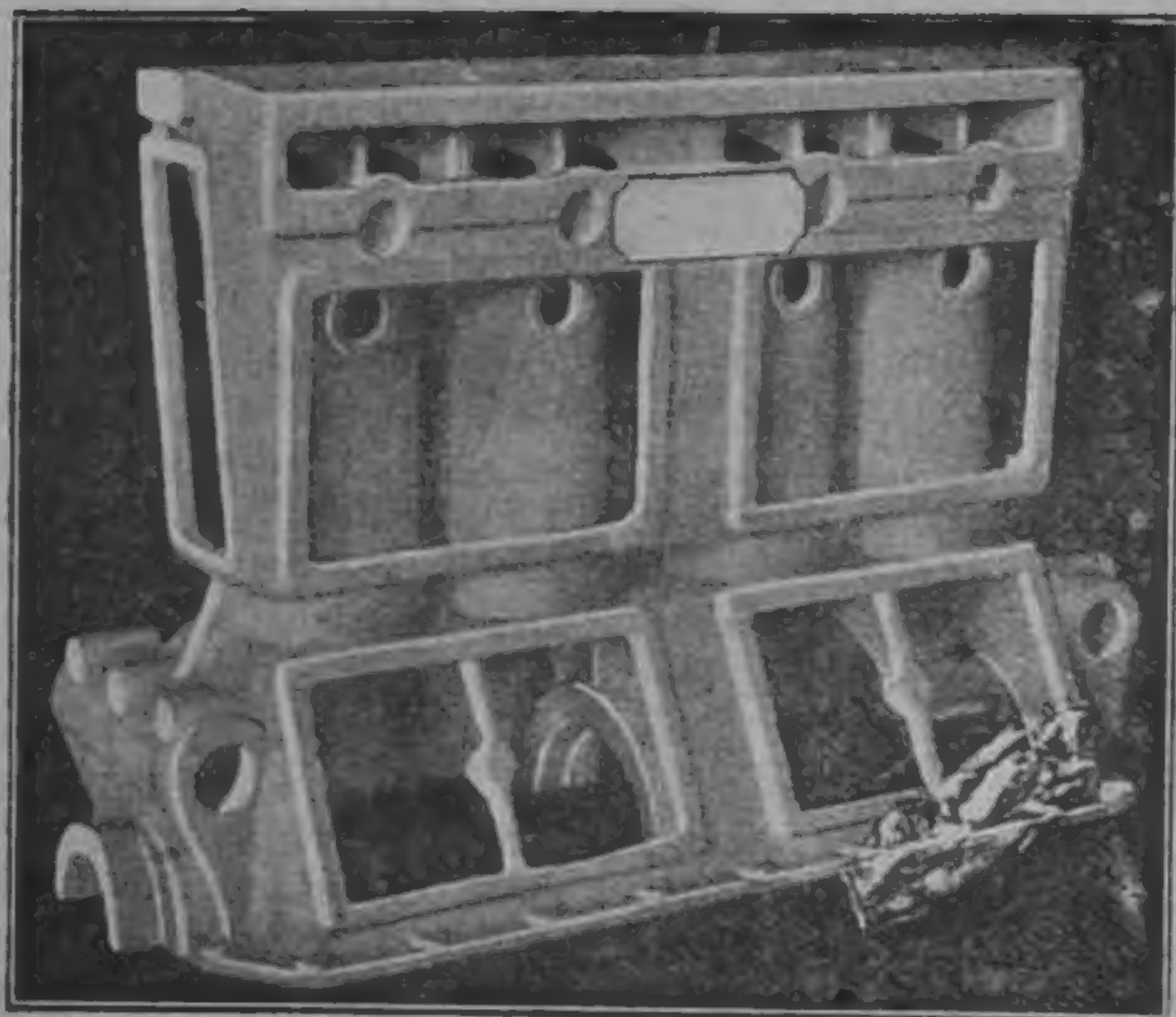
from the seating, and notwithstanding the fact that the seating may be anchored very securely to the aluminium, it is bound, with every degree of heat above that of normal, to become more insecure. Precisely the same applies to a liner, and it can be readily understood that if the aluminium expands away from the top, say, of this liner, leaving a circular edge standing free of the adjacent metal to even so small a distance as 1/1000th part of an inch, it will mean that that edge will become incandescent, cause pre-ignition, and hence "pull up" the engine in the manner so familiar to motorcyclists when an incandescent plug is experienced.

An appreciation of the manner in which the aluminium tends to expand away from the liner may be effected by pointing out (there is no need to give working figures) that the aluminium at, say, a point of the cylinder walls of an engine immediately above the top of the stroke, tends to increase the diameter approximately 3.4 mm., but the liner only approximately 1.4 mm.

In dealing with the matter of the co-efficient of expansion, which is such an important feature in the whole question, the reader of a particularly and able and instructive paper, in which many of the writer's contentions are directly contradicted, before the American Society of Automobile Engineers is credited with the following statement:—

"In several of these constructions the equivalent of a stuffing box that is used at the lower end will permit a slight endways play of the sleeve. My own belief is that such a provision is totally unnecessary, the difference in expansion between the aluminium block (casting—B.Sc.) and the iron or steel sleeve is so slight as to introduce no element of distortion."

Now, in the writer's opinion, this statement is open



A splendid example of aluminium alloy engine casting.

* Mr. Harry Collier informs us that the pistons of the horizontally-opposed Matchless have given satisfaction for 2000 miles, and given further satisfactory service will be made standard when the machine is manufactured in numbers.—Ed.

Aluminium in Motorcycle Engine Construction (contd.).

to question. When it is remembered that the coefficient of linear expansion of iron is .000005567 for one degree Fhr. and that of aluminium .0000136, it will be appreciated that these two coefficients are vastly different when the relative expansions of metal are taken into consideration. It is difficult therefore to accept the reader of the paper's statement. Indeed, the statement is stultified by the fact that a piston when made of aluminium alloy has to be given a clearance approaching three times that of cast-iron. If this is necessary between piston and liner, it is very obvious that grave disturbances are going to take place between the liner and aluminium housing unless the utmost care is taken in the cooling; moderately easy with a car, but practically impossible in a motorcycle engine—imagine the effect of a few miles with an overheated engine!

Reverting once more to the matter of piston design, the reader of the paper in question recom-

mended a length of $1\frac{1}{2}$ times the diameter, and advised that if the weight of the piston could be cut in half by the use of aluminium alloy, experimenters should be satisfied with this ratio of weight reduction. It will be seen, therefore, that if we take, and I talk advisedly, the cast-iron piston as fitted to a $3\frac{1}{2}$ h.p. Norton, we have an article which in itself is remarkably light and durable, in the use of which all difficulties have been overcome, and with which no special considerations have to be dealt with at all. Indeed, again referring to the paper before mentioned, the reader of this sounds the death knell to the agitation that proposed to foist aluminium pistons on a receptive motorcycle public with the statement that they could be fitted with no structural alterations. The quotation is as follows:—"On account of limitations which cannot be removed, occasionally it may be found inadvisable to substitute aluminium pistons for iron ones in an engine already built. The piston unquestionably is the heart of the engine, which should largely be built round the piston."

THE "WHAT IS IT?" COMPETITION.

Final Three Illustrations to be Solved; How in the Event of Ties Awards will be Made.

WITH the publication of the three illustrations which appear on this page the "What is it?" competition, undoubtedly the most attractive test of skill and knowledge that has ever been inaugurated by a motor-cycling journal, comes to a conclusion.

It will be remembered that competitors have been competing for a first prize of any pair of covers and tubes purchasable from any tyre advertiser in MOTOR CYCLING; a second prize of a pair of Dunlop covers and tubes generously presented by the Dunlop Rubber Co., Ltd., of 14, Regent Street, London, W.; and third and fourth prizes commensurate in value with the first and second, which may be purchased by the third and fourth competitors as they think fit from any of the many accessory concerns advertising in MOTOR CYCLING.

In order to prevent the announcement of the result from being too protracted, we have decided to accept only postcards received in this office up to and by the first post on Friday, 12th January, 1917, so that the result can be announced in a special issue of MOTOR CYCLING which will appear on 16th January.

In order, however, that despatch riders and other competitors who are sending in postcards from abroad shall not be handicapped, we shall, in the event of their gaining the same marks as first, second, third or fourth competitors, award them similar prizes. There is, however, one definite exception to this rule, and this is that it *does not apply to men who are sending in from any part of France or Belgium*, as there is, of course, ample time for them to send in their final postcards in the 10 days grace allowed.

In the event of there being a tie for first, second, third or fourth positions, the names of those competi-

tors who have tied will be published. Further illustrations will be given, and the competition continued, so far as the tying competitors are concerned, until first, second, third and fourth positions are discovered. In that event we shall give the results week by week, and if a competitor fails to send in a solution one week he will be penalized. It will be necessary, in fact, for those who remain in the competition to send in their further results by return of post.

These regulations, of course, will not come into effect unless there is a tie, but from our list we should imagine that, at any rate, for second, third and fourth places, a tie is practically certain. However, we feel sure that the keenness of these competitors will not wane at having to continue the competition in order to find the winner. For the sake of perfect clarity, we show numerically how the positions will be found, in the event of nine imaginary competitors tying for second, third and fourth positions. The figures referring to the number of correct solutions given:—

Second place.—A = 36, B = 36, C = 36.

Third place.—D = 35, E = 35, F = 35.

Fourth place.—G = 34, H = 34, I = 34.

Three more pictures published, the nine competitors send in solutions, with the result that:—

A = 39, B = 37, C = 37.

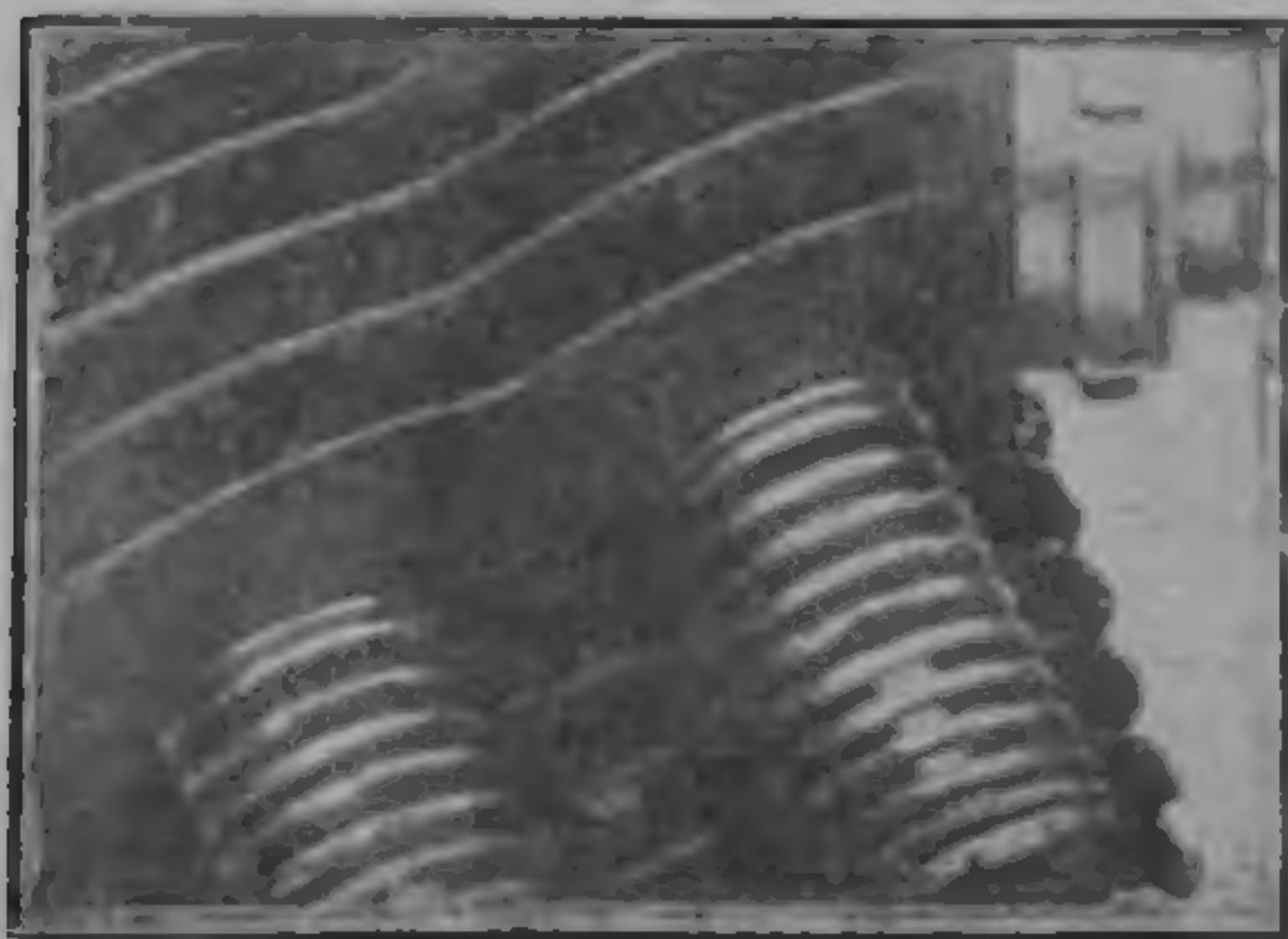
D = 38, E = 37, F = 35.

G = 34, H = 35, I = 37.

Positions will then be:—Second, A = 39; third, D = 38. Second and third prizes awarded.

Three more pictures published for B, C, E and I to compete for fourth prize.

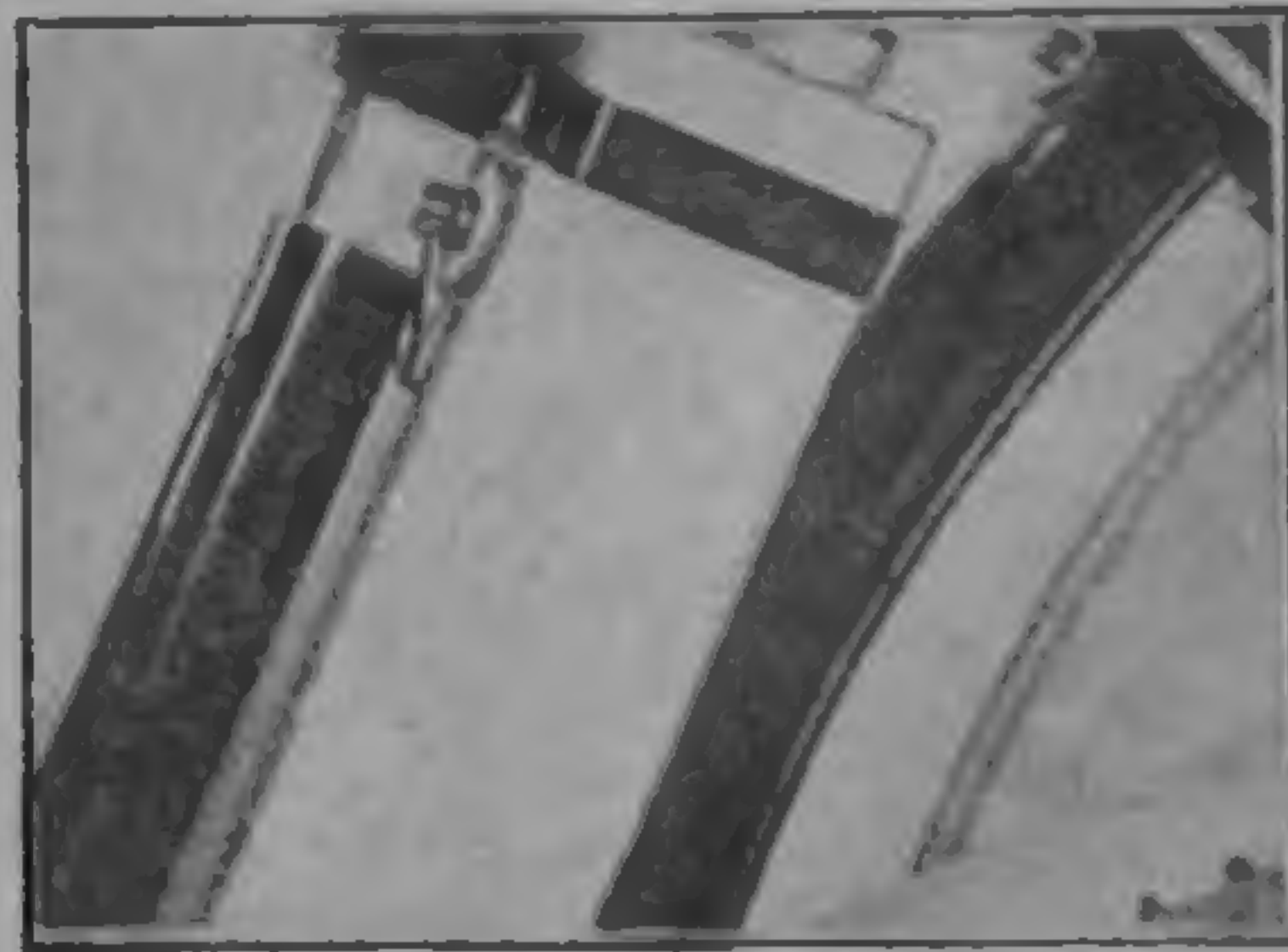
B, say, solves three solutions, whilst C, E, and I are not so successful, hence B gains fourth prize.



37. ? ? ?



38. ? ? ?



39. ? ? ?

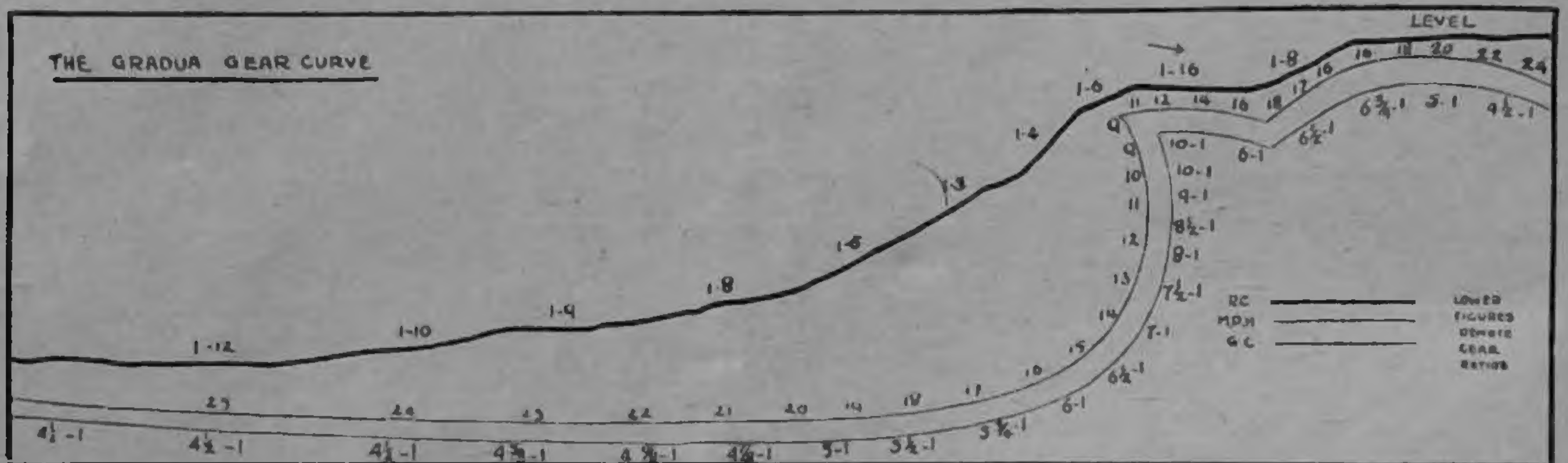
HILL-CLIMBING "CURVES."

Gears, Gradients and Road Speed Plotted Out for Varying Types of Machines.

TO most riders, and especially the newcomer, a new machine is at first a completely strange and somewhat fearsome job to tackle. For instance, the rider of a Douglas mounts a Zenith. Not only does the machine feel strange, but it takes

solves the problem of hills. However, the Zenith machine is quite a difficult machine to drive properly, and one that requires a good deal of skill in manipulation.

It must be understood, however, that the object



Results obtained with a Zenith-Gradua. (R.C.—Road contour. G.C.—Gear curve.)

some considerable time for the owner to become used to the different controls and methods of driving.

The object of this, and one or two following articles, is to initiate the novice and also the old hand into the mysteries of different machines and the best method of riding them.

To begin with the makes of machines must be classified into rough groups, and we find that these can be disposed of in seven groups:—

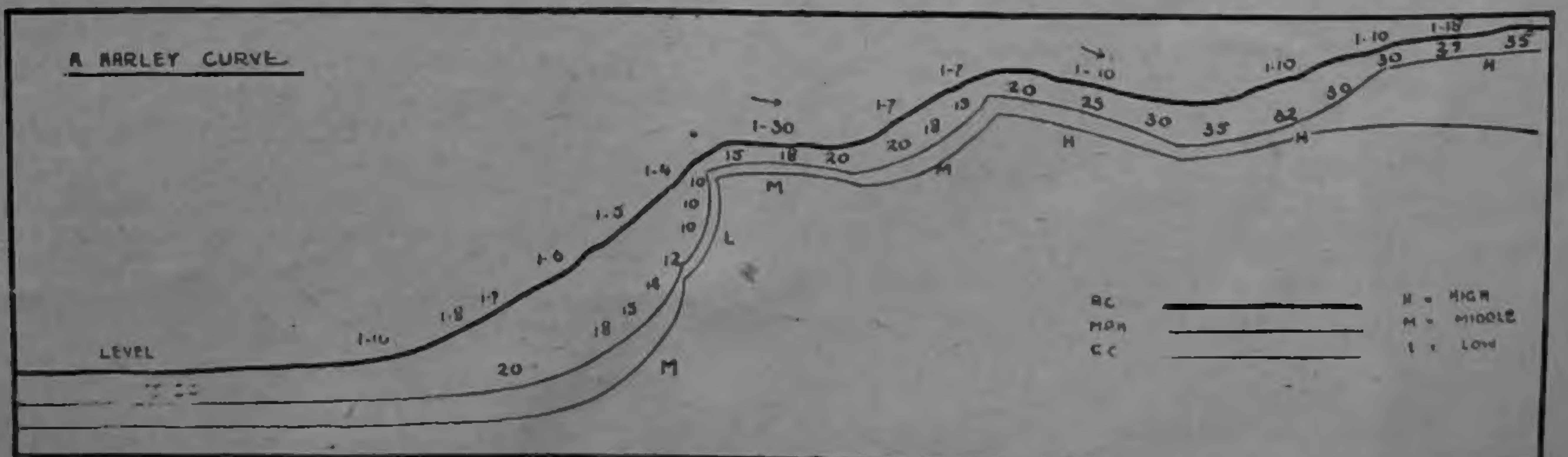
- The two-speed belt and chain single.
- The two-speed belt and chain-drive twin and the two-speed all-chain drive models.
- The three-speed belt and chain drive single twin.
- The three-speed all-chain single twin.
- The all-chain drive, four cylinders.
- The shaft drive, four cylinders.
- The all-belt drive single and twin.

It is not proposed to take all makes of machines, as it is only the outstanding and original designs that require different handling.

Suppose, then, that the first machine is a Zenith. To a rider who has never been on a Zenith the machine is a mystery, although to most minds the gear

of these articles is the proper driving of machines, and when it is mentioned that a certain machine is difficult to drive it must be taken in the sense that it is a machine that will repay the driver to an astonishing degree if driven as it should be; not driven as if it were just an engine with a gear attached.

The secret of good Zenith driving is not so much to lower or raise the gear ratios on varying formations of road as to take into conjunction the throttle opening, so that the three things to learn thoroughly are the best possible admixture of gradient, gear ratio, and throttle opening. On approaching a hill on a Zenith, and one which it is proposed to mount at a fast rate, the ear plays as important a part as anything. The best method is very gradually to open the throttle and as gradually to lower the gear. The ear sense governs the revolution speed. Never by any chance pull the gear round quickly, for this means that the rider loses the primary object for which the gear was intended and which its name implies, i.e., Gradua or gradually—little by little—or bit by bit, as it were. Another and quite as important a point



A Harley-Davidson affords a different problem. (R.C.—Road contour. G.C.—Gear curve.)

"Hill-climbing Curves" (contd.).

is to close the throttle as the hill is surmounted in conjunction with the raising of the gear.

Take as an example another high-powered twin, the Harley-Davidson. Here is found another machine that takes quite a lot of driving if the best is to be got out of the power unit, which is a very powerful and sweet one.

The whole secret of the Harley lies in manipulating the clutch in conjunction with the throttle and the speed ratio employed. To the man who does not know a Harley a few explanatory words as to the Harley clutch will not come amiss.

Briefly the clutch is composed of metal and fibre plates that are made to withstand continuous slipping, and, in fact, act as much as a shock absorber as the clutch. It can be seen, then, that different settings of the clutch must be applied to each and every opening or closing of the throttle. It is a sad but true fact that a great many riders of the Harley-Davidson do not drive their machines in this way, although they get explicit instruction to do so from the H.-D. people. However, perhaps a few hints and tips will help those and many others who may be investing in one of these machines.

The best plan is to push the clutch pedal forward about twice the amount of every slight opening of the throttle, i.e., for $\frac{1}{16}$ in. of a throttle opening, push forward the clutch lever $\frac{1}{8}$ in., and, of course, vice versa for slowing, etc. This is for high, and the same applies to second and low.

Do not hang on to a hill on top. The second is by far the best climber for single figure gradients, and, above all, make perfectly certain that the clutch is working gently and not in a fierce way.

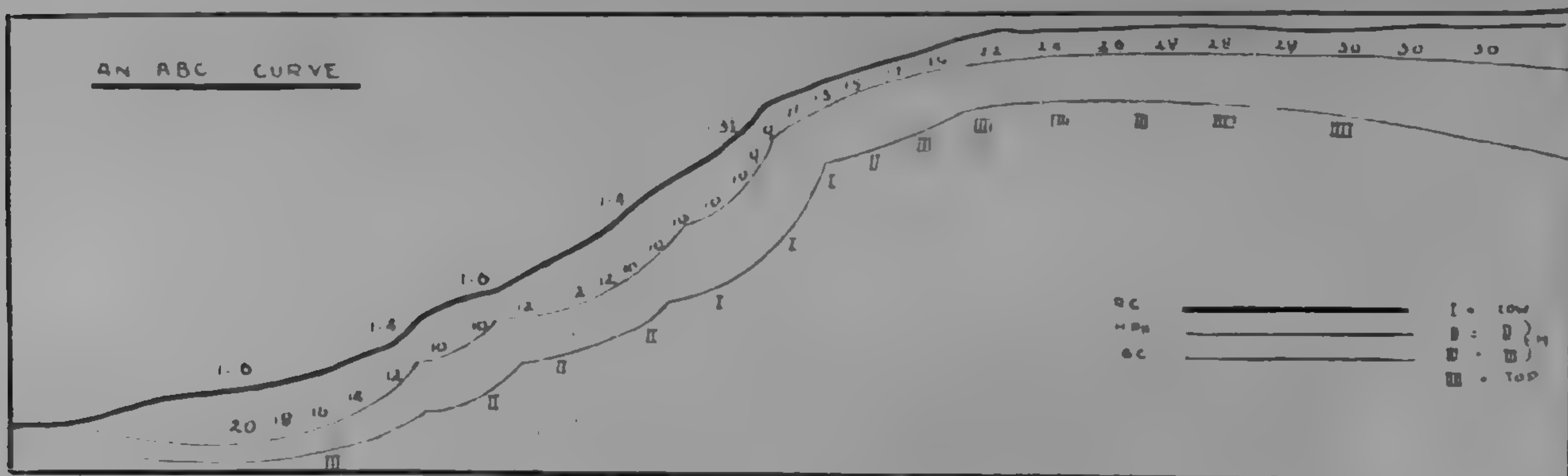
The best and most efficient way of climbing a hill on a Harley is to press in the clutch, say, $\frac{1}{4}$ in., and open out the throttle correspondingly at the foot of the hill. Wait till the gradient of the hill commences to slip the clutch; do not push in the clutch further and advance throttle, but change down.

An A.B.C. machine is another machine differing from the usual. Here the rider may have no qualms about overheating through revving the engine on a long and hard pull. The very best advice the writer can give is to say "let her rip, but not on too stiff a gear."

The reader will see on looking at the A.B.C. curves that it is provided with a four-speed gearbox, and the lower gears should be used with freedom, especially if a sidecar be attached. The gear should be slammed in sharply in conjunction with the use of the clutch, of course, which is hand controlled.

The whole secret of every machine, in fact, is never letting the load overcome the revolutions, and it is a matter of study for each particular machine. Map out the machine under four headings: power output on top with and without sidecar; gradient or r.c. and m.p.h. and g.c. on top, on middle and on low; heating propensities on all three gears on single figure gradients; oil and petrol consumption. It will repay the rider and lessen anxious period on unknown hills.

SPOR.



The four-speed gearbox of the A.B.C. also makes a difference. (R.C.—Road Contour; G.C.—Gear Curve.)

Random Notes.

An Interesting Headlamp Lens.

American enterprise is offering a very interesting head-light lens, called the "Conaphone," which is claimed to eliminate the disturbing back-glare experienced with ordinary electric lights. This lens is provided inside with horizontal corrugations, which concentrate the rays into one long, intense beam. The patent Noviol glass used eliminates the violet-blue rays found in an ordinary electric lamp beam, giving the light great penetrating qualities in fog, etc., and eliminating "back glare." The device is patented.

Highway Obstruction Liability.

An interesting case came before Mr. Justice Ridley and Mr. Justice Avory, in the King's Bench Division, when the question of the liability of an owner for highway obstruction by a tree blown

down from his land was raised. Defendant, a farmer, appealed against a County Court decision awarding damages to a car driver, for personal injury and damage caused by defendant failing to remove or give warning of a large tree, which fell across the road from his property. Negligence was alleged against defendant to the effect that he had been told early in the day about the tree, and yet left it without a light or guardian. For the defence it was contended that no obligation devolved upon an occupier of property adjoining the highway to remove an obstruction caused by an act of God. Leave to appeal was given, Mr. Justice Ridley giving it as his opinion that there was no duty on defendant to keep constant guard on the tree, or to place lights upon it. If, after being warned to do so by the Highway Surveyor, he had not removed the tree, the negligence would

have been obvious, and defendant would have been guilty of wilful obstruction.

The 1917 Harley-Davidson.

In the first description and illustrations of the 1917 Harley-Davidsons that appeared in our last issue, a slight slip occurred. It should be noted that the spark and exhaust lifter are controlled by the left-hand twist grip, the right operating the throttle.

Brisk Motor Spirit Order.

An order has been issued by the Army Council stipulating that no motor fuel must be sold to any person except a licensed dealer in Ireland, unless the purchaser presents a licence allowing him a specified amount. The amount sold must be recorded by the seller on the said licence.



The man of the moment.

WE'RE all in it—discharged—unfit—exempted. So says the man of the moment, David Lloyd George, Dictator of England. What will be the effect on the motoring world? That remains to be seen, but arguing that there will be a big increase in munition workers—munition workers make big money—always faulty accommodation near big works, *therefore* there will be a big increase in the demand for the handy, economical motorcycle.

AT this time of year a good deal of attention is given to the question of clothing, and once more the type of body covering (one can hardly call it clothes!) that the Army provides makes a pressing appeal. The "what is it?" illustration that appears on this page of the three hairy bears includes a photo. of R. W. Moffat, the well-known Douglas competition rider. Can you pick him out? Incidentally, Moffat was one of the successful trio who won the team prize in the last Six Days. Happy times!



"Try our line in winter clothing, inexpensive and durable. B.E.F. and Co., Unlimited, recruiting branches everywhere."

A10

THE WEEK'S GOSSIP.

News and Comment
--From--
All Quarters.

ALTHOUGH suffering from physical infirmities so well known to his friends, plucky little J. H. Jeffry, secretary of perhaps one of the most popular motorcycle clubs in England, the Streatham and District, is working "all out" on war work on behalf of the Government. What this work is I am not at liberty to say, but old friends will be glad to hear that all communications addressed to Jeffry at the Café Spitz, Basle, Switzerland, will reach their proper destination.

THIS is a true story. A private came into a medical officer's hut recently and asked to be excused from route marches over 15 miles in length. Seeing that the man walked with perfect ease, the M.O. asked the reason for the request. It then transpired that the man had previously seen active service in another regiment, had had a foot shot off, and been given an artificial extremity. He could walk up to 15 miles with comfort, but after that distance began to get tired. The fears of the similarly mutilated that motoring is now a sealed book to them are surely unjustified, if the artificial foot can perform such wonders! In this direction there will be undoubtedly a big market for motorcycles capable of being driven by the maimed. It is a market that should receive attention.



Mr. Frank G. Barton of the Morris Garages.

HAPPENING down the Oxford road the other day called in at the Mecca of Oxford motorcyclists, the Morris Garages, which is greatly extending its motorcycle activities. Had an extremely interesting chat with Mr. Frank G. Barton, the managing director, whose experience with early motorcycles and cars dates from the time of the Coventry motettes, which were the English edition of the Leon Bollées. As a matter of fact, his first motor-cycling experience was with a Marot-Hardon, which was fitted with a 2½ h.p. De Dion engine festooned gracefully about the back axle. At the present time, or, if not at the present time, recently, we have all suffered from the petrol shortage, but this is nothing compared with the difficulties that had to be overcome in those early days. To use Mr. Barton's own words: "Illustrating the petrol position at that time, I ran out of this at Waddesdon. I hired a trap and drove to Aylesbury to buy some, but found the only dealer selling this all dressed up ready for church, and he informed me that his conscience would not allow him to do business as it was Sunday. I suggested that to ease his conscience, and assist me to get back to Oxford, he should give me a couple of gallons, and I would present him with an equal quantity on the following day. But he would not even do this. Result. I had to take the trap back to Waddesdon to pick up my friend, drive back again in a landau to Aylesbury and train back to Oxford. I believe this petrol fiend is now a 'motor dealer' 'somewhere in England,' but I do not know if he is still a conscientious objector."

ALMOST had a paralytic shock last week at the sight of the most weird machine that has ever been evolved from the weird imaginings of an American motorcycle designer's brain. 'Twas the famous Militaire, an example of which reached this country some while ago. It was, I believe, offered to an Allied Government, to be supplied in quantities, but for various reasons was turned down. I

A DESPATCH RIDER WITH THE FRENCH ARMY, IN APPRECIATION OF HIS TRUSTY TRIUMPH, WRITES AS FOLLOWS:—

“I am glad to let you know that after 12 months riding in all weathers, and very often on impossible roads and ways, my 1915 Triumph is working splendidly. I have never had any trouble with my machine, and I WOULD NOT CHANGE IT FOR ANY OTHER MAKE.”

A CORPORAL SERVING WITH THE M.T. writes:—

“We are having a very busy time of it. but the old “TRIUMPHS” keep smiling. If you could only see the places they have to go through, you would say it was not possible, but the TRIUMPH gets there and gets back again.”

TRUST THE TRUSTY TRIUMPH.
TRIUMPH CYCLE Co., Ltd., COVENTRY.

TRIUMPH



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Kempshall Oversize Tyres-700x85.
Gives thousands more miles
than any other tyre

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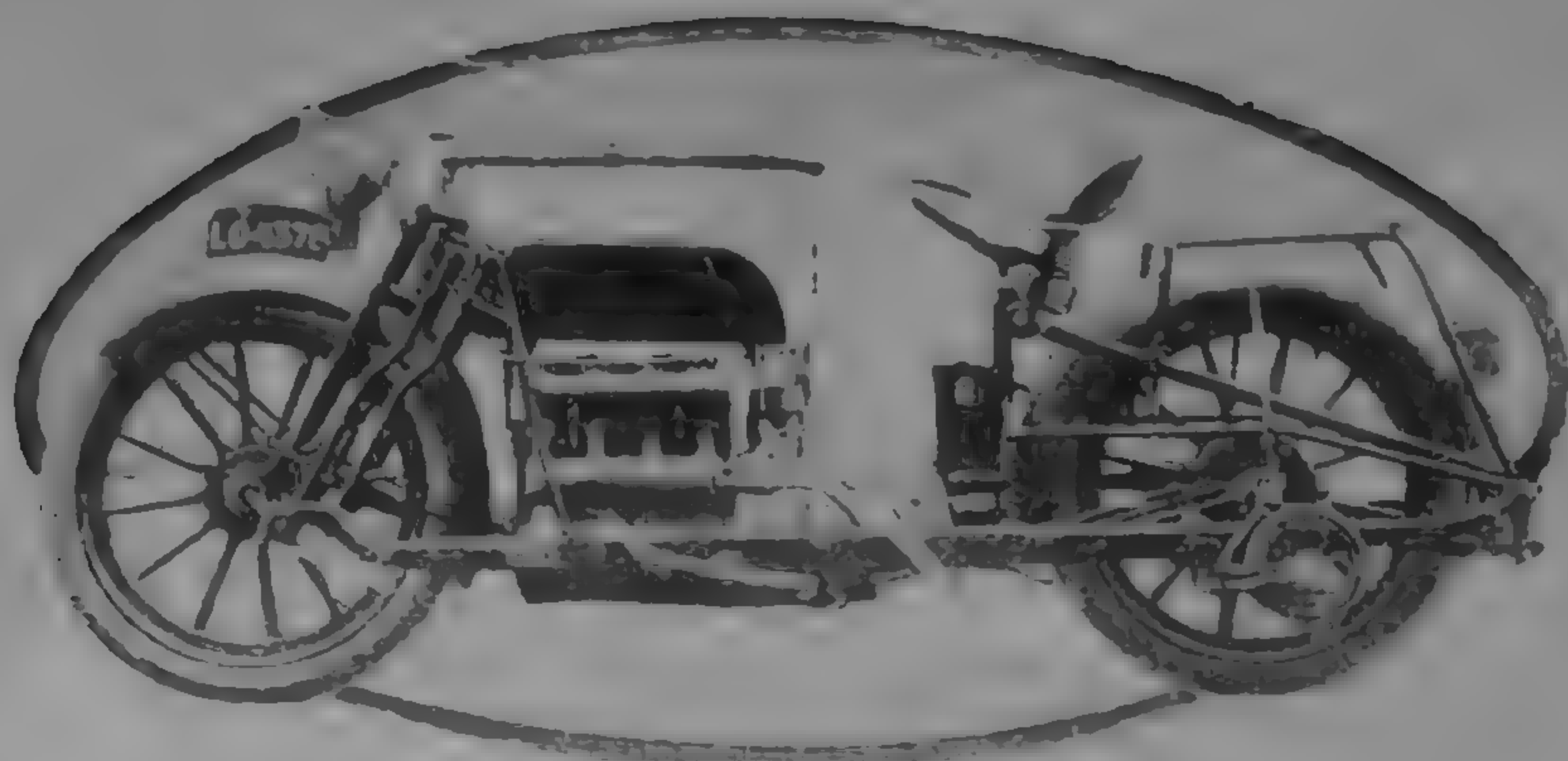
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Cambridge Street Rubber Works, Manchester;
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Coventry—G. R. Bramley, Warwick Chambers, Warwick Row.
Birmingham—Reginald G. Priest, 71, Lionel St. Leeds—111, Spencer
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Scotland—Percival E. Pele, 27, Jamaica Street, Glasgow.



The Militaire again. An example of which is actually on sale in this country.

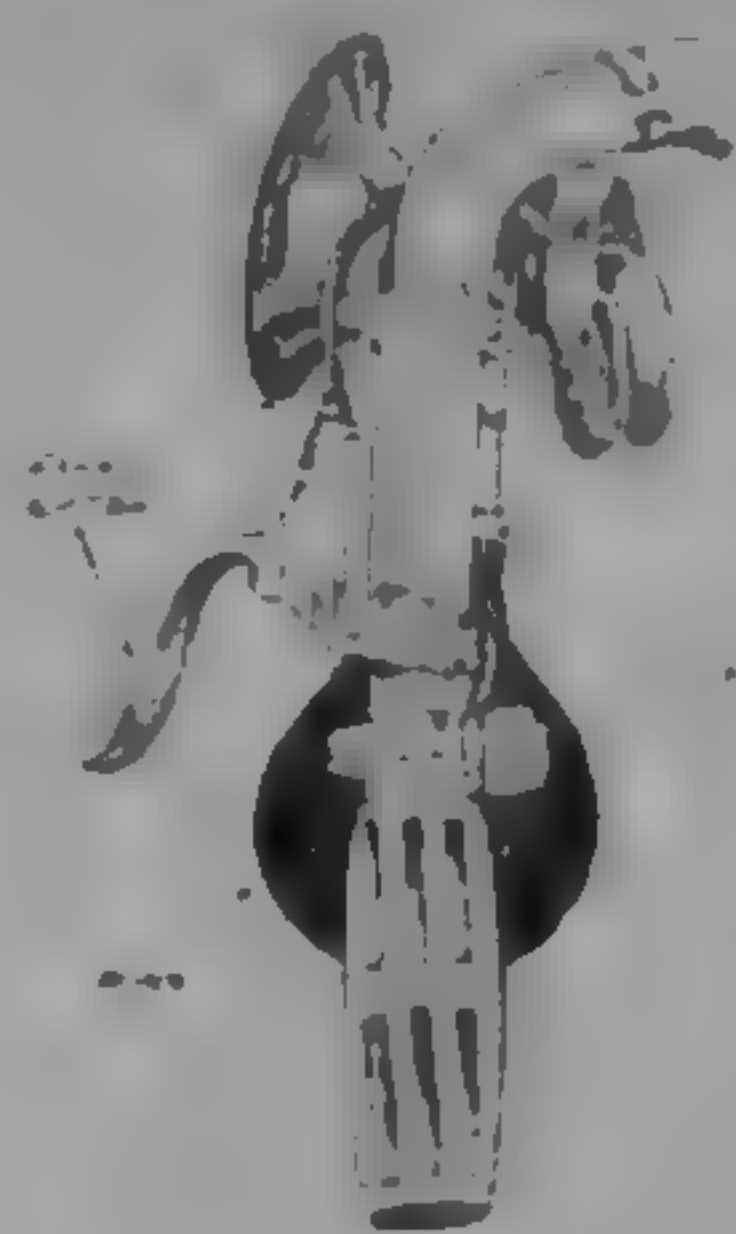
noticed two people struggling with it—first it would sway on one side, then to the other—more frantic efforts on the part of the two, and once more an upright position would be obtained. The weight is terrific, as might be expected with girder frame construction, four-cylinder engine, and a three-speed and reverse gearbox, which, so far as strength goes, would be suitable for a six-cylinder car. Nevertheless, I expect that for a mechanically-minded person this machine would make a most fascinating sidecar outfit. Incidentally, I note that it is advertised in our small advertisement columns.

SAW a Flying Corps officer, with the face of a youth of twenty and pure white hair hurtling down Oxford Street on a big Indian the other day. Those snowy locks spoke as eloquently as anything could of the ordeals through which the airmen pass "out there," and yet come through safe and sane. And hundreds of them were pre-war motorcyclists! Who says motor cycling does not give a man nerve?

REAR lights for bobbies are the latest thing in helpful suggestions towards minimizing the dangers of darkened streets. Some wag also suggests a white headlight to warn off approaching traffic, and an adaptable green slide for the rear light to indicate "clear road ahead" to waiting traffic. The constabulary lighting scheme could, in fact, be extended quite considerably, and a real indicator board, controlled by a central switchboard on Robert's person, provided, with illuminated signs: "Stop," "Go on," "Keep to the Left," "Road Up," "Mind the Steam Roller," etc. A few suitable terms of abuse might also be provided, and would, no doubt, come in very handy at times. Practice in controlling the switches should be insisted upon, however.

IN these columns of 28th November appeared a photograph and a short reference to a heat producer fitted by a corporal of the R.E. to his Douglas, "B.E.F." This was certainly "some" pipe, but I think I unearthed one last

week in "Blighty" which, writes a correspondent, "leaves it standing." The article in question was fitted to a 5-6 h.p. Bat-J.A.P. owned by Mr. Alex. Thom, manager of Mr. P. J. Evans's depot in Birmingham. What the pipe originally did was not certain, but it bore a strong resemblance to a stove flue. Anyhow, it was 1 yd. long by 2½ ins. diameter, and the two engine exhaust pipes were led straight into it. As to the "tone" imparted, I can speak in confidence, having heard it, but it has not so far come under the eye of the law, as Thom rides it daily in the city, at least he was doing so when last I saw him. In addition to this the bus is of interest for its tractability, for it is single-gear 3½ to 1, and Thom tootles about "Bum" in all weathers and traffic and assures me he finds no difficulty in control. That it can shift is proved by the fact that, exactly as I saw it, it had done 65 on Brooklands with Thom in the saddle.

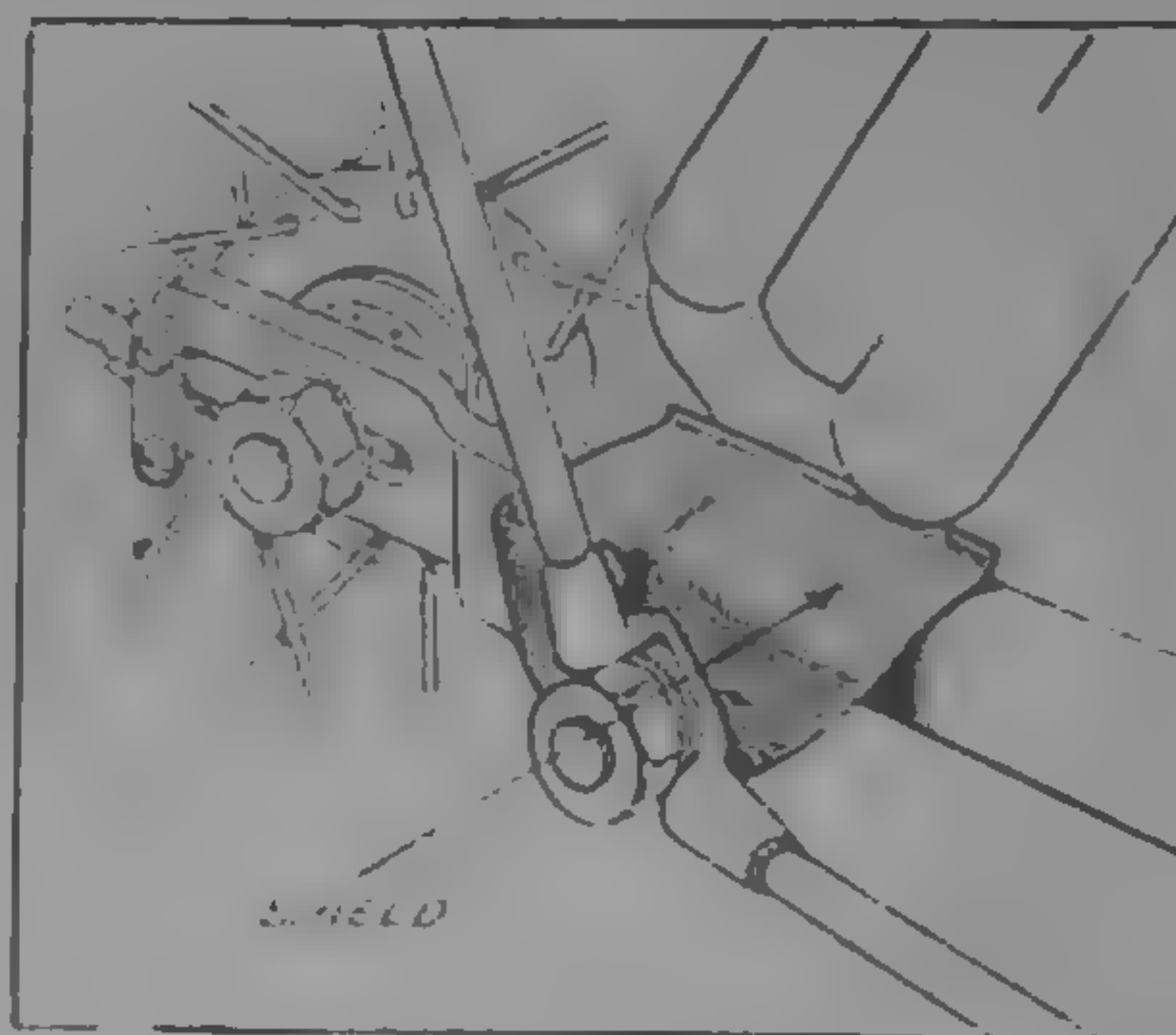


The neat control details.

Not so had a contrast to the town pottering. Thom is a real enthusiast about his bus, and is very bucked with various

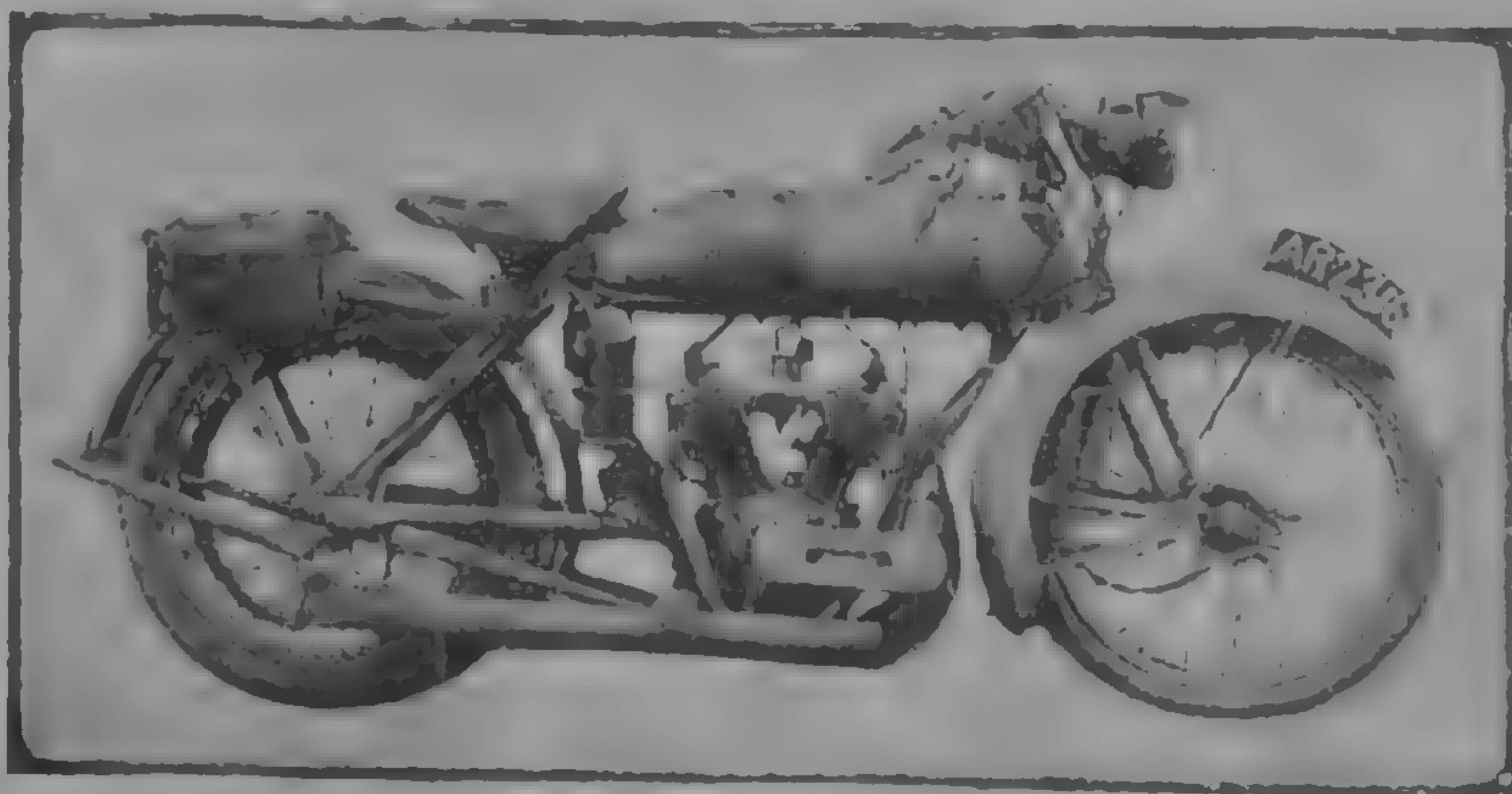
gadgets he has rigged up. One of the sketches shows an idea of his to give easy control. In place of the usual Bat cut-out switch he has fitted one of the push-button type just on one side above the left grip (an Indian, by the way), which is always accessible for the thumb of his hand in its natural position on the bar. Likewise, the horn bulb is placed directly below the grip and can be operated by the fingers without removal, and the exhaust valve lifter is again within easy reach, so that he has here all he wants to save impact with the back of a tram or running down some unfortunate pedestrian, being able to toot his hooter, operate his cut-out, and lift the exhaust in one go, so to speak. Another little fitting which he has proved of much value is depicted in the other sketch, showing a shield over the double ball race of the front spring fork joint. This has entirely prevented wet and mud, which trickles down the fork blade, getting into the bearings. A good idea.

NOMAD.

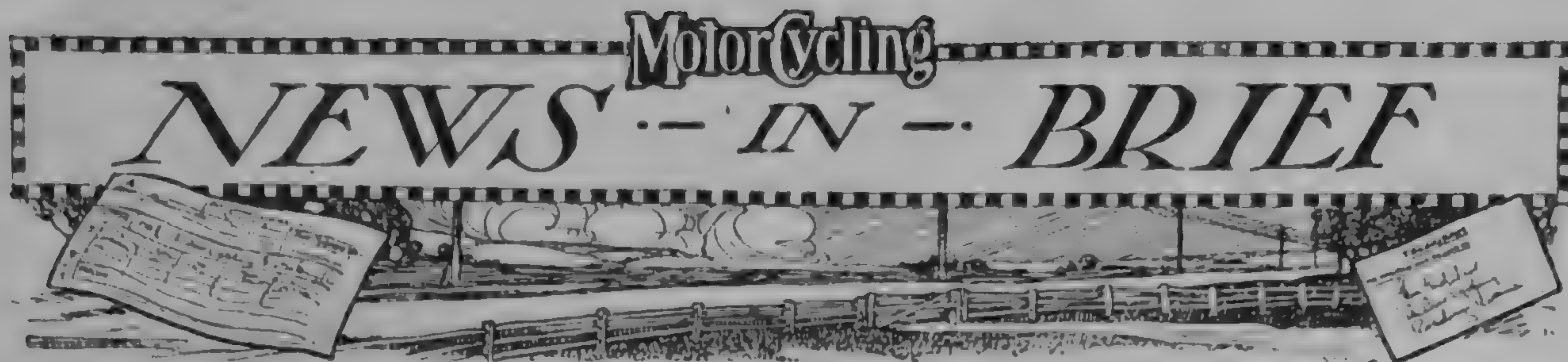


The fork-end shield.

The Editor will be pleased to receive contributions for these columns. These will be paid for at a special rate. Paragraphs should be brief, or they will not be accepted.



The exhaust pipe competition; the latest aspirant.

LEADING CONTENTS ON
OTHER PAGES.

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LIGHTING
—UP—
TIMES.

Next
Saturday,
30th December.



MOON.—In first quarter.

Swiss Mobilization.

The Swiss Government is taking a census of all motor vehicles and motorcycles which might be available for the use of the military authorities.

Another Second-hand Show.

The date of the next Second-hand Motor Show in London is announced as March, 1917. The Show will be held in the Agricultural Hall, as before.

Why Magnetos are Dear.

The price of platinum at the present time is about £14 per ounce. The news is, therefore, welcomed that a silver and gold alloy, silver predominating, will make a good contact if the surface is greatly enlarged.

Rumanian Property Difficulties.

German possession of the Rumanian oil-fields places the Motor Owners' Petrol Combine in a dilemma with regard to their annual report. Although a report for 1915 has been issued, their properties are in possession of the enemy and they have no information regarding the former to give the shareholders. Audited accounts for this period cannot, of course, be presented in the circumstances.

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Petrol Prices to Decrease.

It is rumoured that the present prices of petrol are likely to go down early in the New Year. Is this a result of the new Government? If so, Lloyd George's régime for ever!

C. and M.T. Benevolent Fund.

Subscriptions to the amount of well over £3000 have been received by the Cycle and Motor Traders Benevolent Fund in connection with the President's appeal, among the contributions being 100 guineas from Messrs. C. A. Vandervell and Co., five guineas from the Coventry Chain Co., etc., etc.

The Father of the Douglas Engine.

Few people know that the actual designer of the famous Douglas horizontal twin engine is Mr. Joseph Benter, works manager of the Douglas factory. Mr. Benter has set rolling a ball which seems likely to over-run every type of engine but the "flat" twin in time, especially now that the Americans are copying it with so much enthusiasm.

The Rumanian Oilfields.

According to the daily Press, the Rumanian oilfields, recently captured by Germany, cannot be worked for many months yet, at the end of which time they will probably be in the hands of the Allies again, so the loss to us is nil. Meanwhile, the petrol situation remains unchanged, as we had not, previously to their capture, been dependent upon Rumanian oilfields for our motor fuel supplies.

Dunlops Bring an Action.

An action was brought against T. Humphries, a cycle and motor engineer, of Enniskillen, by Messrs. The Dunlop Rubber Co., Ltd., for underselling of their tyres by the said engineer. Mr. Healy, K.C., in opening the plaintiff's case, said it was the principle involved which had decided them to come to court, as, once an underselling precedent were established the concern might put up its shutters and tell its shareholders that it was no longer able to earn dividends. Mr. Justice Barton, in giving judgment for the Dunlop Co., said it was only right to warn traders in the country who might be tempted to regard these agreements as trivial that it was most important for them to pay due regard to their obligations under these contracts. A serious principle was concerned, disregard of which might involve such people in litigation and heavy costs.

Situations Vacant.

There is still a vacancy on the Editorial staff of MOTOR CYCLING. Applicants must be either discharged from or ineligible for the Army. Applications should be made to the Manager, Temple Press Ltd., 7-15, Rosebery Avenue, London, E.C.

H.-D. Support for the Marylebone Volunteers.

Among the contributions for the pipers' band in connection with the Marylebone Volunteers, Alderman Duncan Watson has donated £5, the Harley-Davidson Motor Co. £5, and Mr. Walter Davidson has forwarded £5 as a personal donation to back up his colleague's efforts on this side.

Bad Lighting Fatalities.

The new lighting restrictions are taking their toll of human life and limb. Presiding over an inquest on a street accident fatality, the Coroner of Ilford remarked that such tragedies were becoming all too frequent. He had given up driving at night himself, having seen what a number of accidents were caused by the Stygian blackness of our crowded city streets.

Mr. W. H. Eggington's Accident.

We made inquiries last week as to the progress of Mr. W. H. Eggington, of Messrs. Jos. Lucas, Ltd., Birmingham, who some time ago met with a nasty accident, being run into by a car whilst riding his motorcycle. Mr. Eggington sustained a broken leg just below the knee, and the fracture has been a difficult one to heal. We learn he is still confined to hospital, but is going on well. Mr. Eggington is well known to Midland motorcyclists as joint hon. trials sec. of the Birmingham M.C.C. We wish him a speedy recovery and return to active life.

American Exaggeration.

Writing of the Chicago Motorcycle Show, a scribe to the "Nottingham Guardian" says:—"There was nothing at the chief exhibition of 1917 American machines to frighten or disconcert British makers. The main tendency is towards exaggeration of the nominal horse-power, in the usual American vein of tall talk. Thus, what we term a 6 h.p. passes in the States as a 16 h.p., and a good sized single-cylinder would blush to be rated at less than 6 h.p. over there. This fashion has grown up in a curious way. Each maker annually draws the attention of his clients to the increased efficiency of his engines, by piling up the rated horse-power without increasing the size of the engine.

News in Brief (contd.).

Big Train Fare Increase.

There are rumours abroad to the effect that not only will train services be greatly curtailed after 1st January, but railway fares may be increased by as much as 50 per cent. in some districts. If this is so, despite the price of petrol, the New Year should see a decided rush for motorcycles. Bad enough never to know when you may expect to arrive at or from business, but to pay extra for the privilege—most people would prefer road transit. Commercial travellers will find the motorcycle and sidecar a solution of a difficult problem.

The Index Mark System.

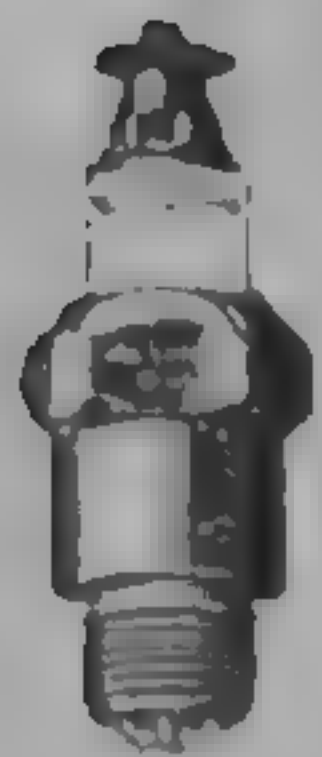
Few motorists comprehend the system upon which index letters and numbers for their machines are allotted to different counties. Most people seem to think that the different letters of the alphabet are scattered broadcast among the counties, with no system of distribution at all. As a matter of fact, the letters are given according to the population: thus "A" for London, the most densely-populated county, "B" for Lancashire as the next, etc., etc. The numbers generally run up to 10,000 for each separate letter: when 10,000 cars or motorcycles are bearing the same letter another is added.

Higher Tax for Motorcycles.

Advocating an instant increase of taxes to reduce the National Debt as far as possible before the end of the war, a writer in the "Spectator" says: "There ought also to be without delay a revision of the scale of licences for motor-bicycles and motorcars. Mr. McKenna made the mistake of proposing to double all licences—a crude proposal which would have worked considerable injustice—and when he dropped that scheme did not formulate any new one." It is a relief to find that the writer does suggest one or two sensible luxuries which should be further taxed, such as dogs, jewellery and plate, gas and electricity, etc.



With the British armoured cars in the Caucasus. We should imagine that the task of the D.R.s who are attached to these units is about as arduous as it would be possible to imagine. The "roads" consist of boulder-strewn paths blasted out of the solid rock—dry watercourses and boggy tracks.



HINTS AND TIPS.



Extra Air Valve—Starting up Auto-Wheel Scooters—Footrest Adjustment—Attaching Knee-Grips—Heating up the Carburetter—Combined Exhaust Lifter and Switch.

AS we stated in a recent issue we shall from time to time give selections of hints and tips which have been forwarded to us by our readers in connection with the recent Hints and Tips competition, which was one of the many new and interesting features inaugurated by MOTOR CYCLING. We shall be pleased in the future to receive a further selection, and in the event of any reader's contribution being published two sparking plugs will be forwarded to him or her upon application.

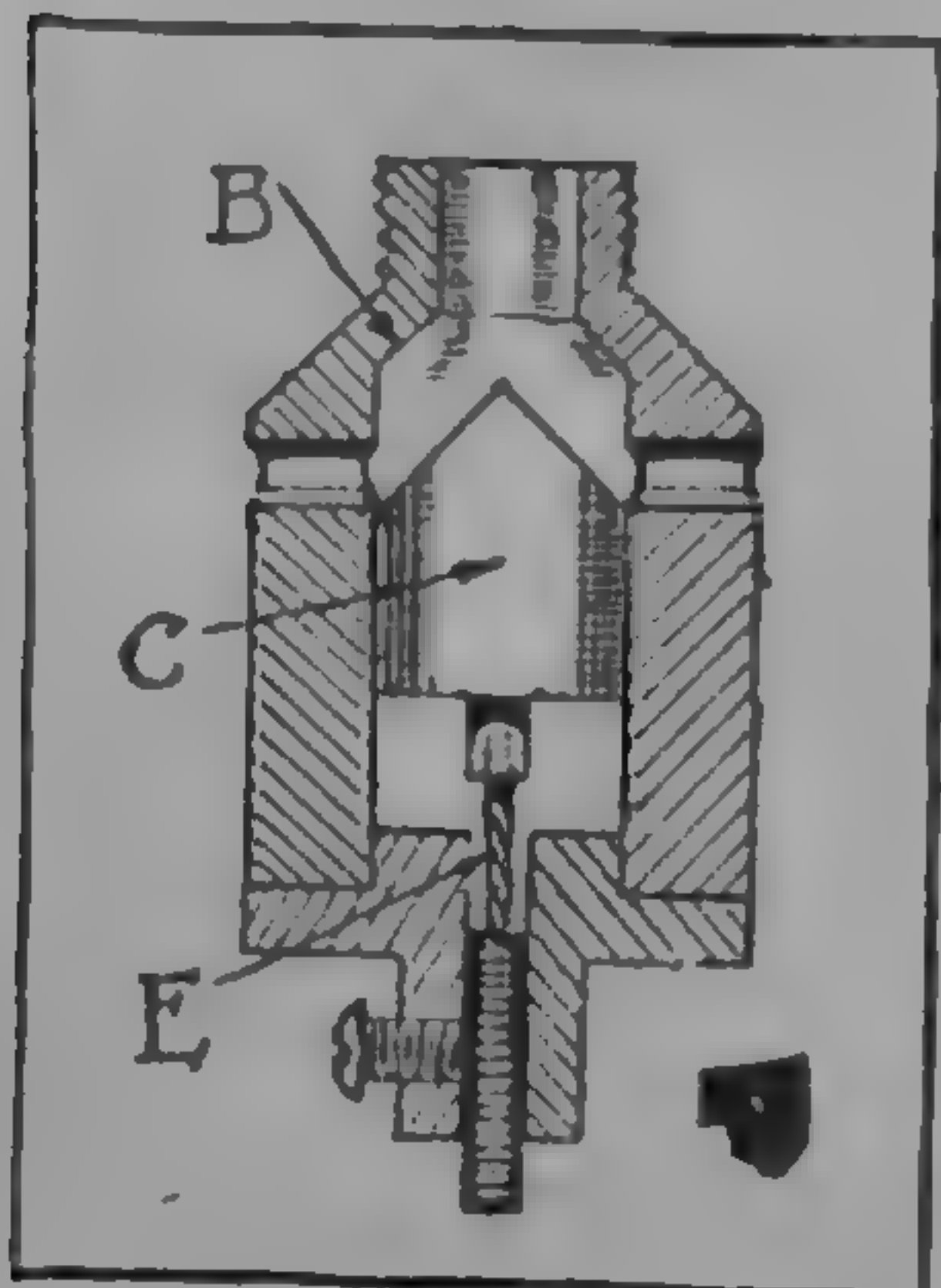


Illustration No. 1.—How to make an effective air valve.

The first illustration this week shows the construction of a hand-operated extra air inlet which can be easily made by those who are in possession of a small lathe. The body of the valve is turned to 1 in. diameter overall, being first drilled with a $\frac{1}{4}$ in. and then with a $\frac{1}{2}$ in. drill, the shoulder (B) being left for the plunger (C) to bed upon. When this plunger, which is actuated by the Bowden wire (E), is withdrawn it uncovers four $\frac{1}{8}$ in. holes drilled in the casing (A), allowing air to be sucked into the induction pipe of the engine. Incidentally, it may be mentioned, the suction from the engine does away

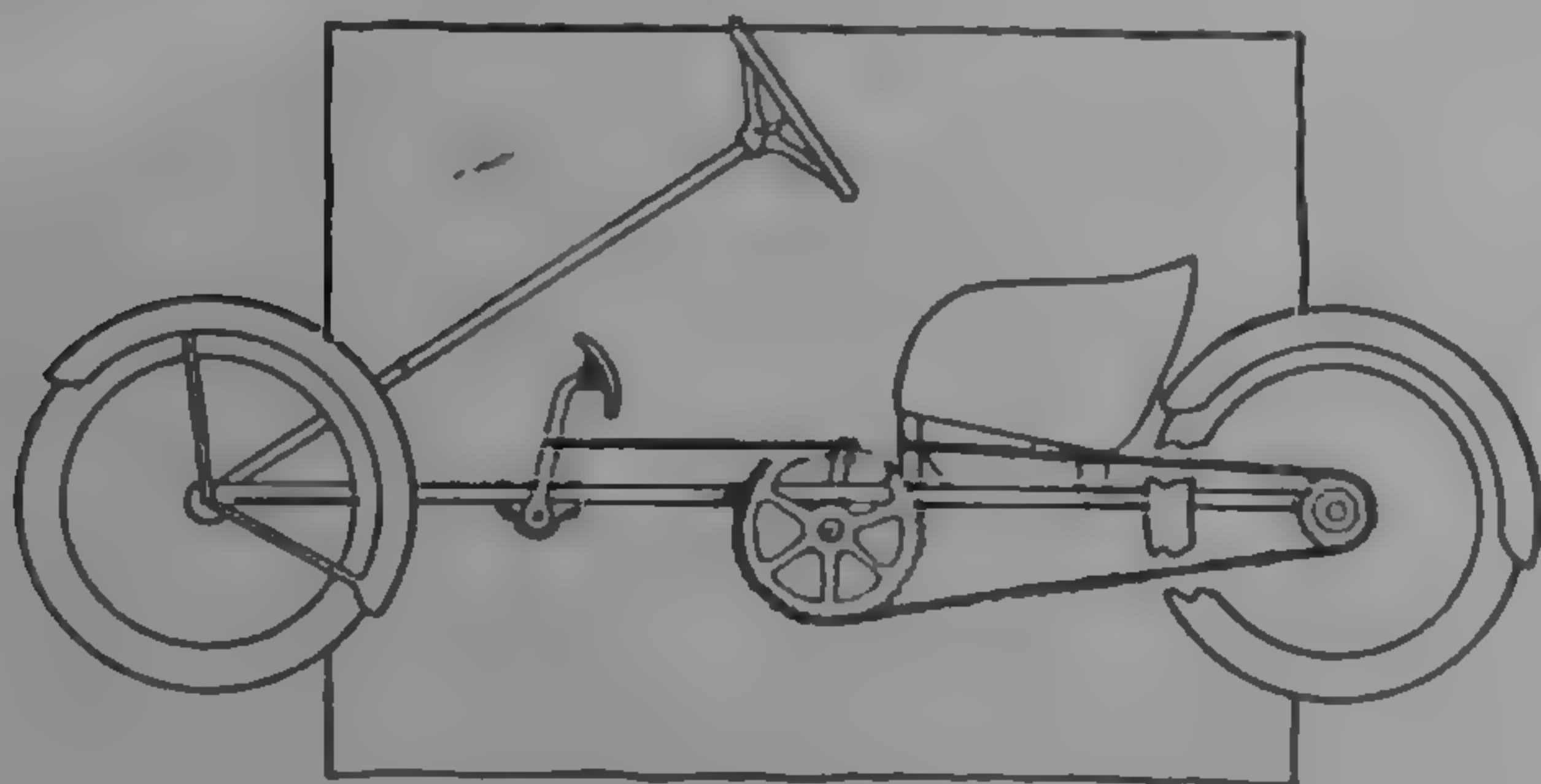


Illustration No. 2.—For starting up an Auto-Wheel propelled scooter runabout.

with any need for a return spring behind the plunger. It is pointed out that in actual use this device answers its purpose very well and causes a decided increase in power and speed and a decrease in petrol consumption. It is rather a strange feature that the provision of a simple extra air device such as this will permit air being admitted to the cylinders when a further opening of the air slide of the carburetter causes choking. Especially is this so on engines of the horizontally-opposed type and with those with long induction pipes.

A. C. H. GLAZE.

Norfolk Lodge, Bushwood, Leytonstone, Essex.

A16

IN a recent issue we published an illustration of a simple little four-wheeler which had become extremely popular in the States, consisting of a simple chassis mounted on four cycle wheels and propelled by the American edition of the English Auto-Wheel. The main difficulty is, of course, in starting this little runabout, and we appealed for ideas as to how this could be carried out. In illustration No. 2 a suggestion is made for carrying this into effect. Keyed to the off-side back wheel is a small sprocket containing a free wheel. Immediately in front of the bucket seat is a much larger sprocket, the two being

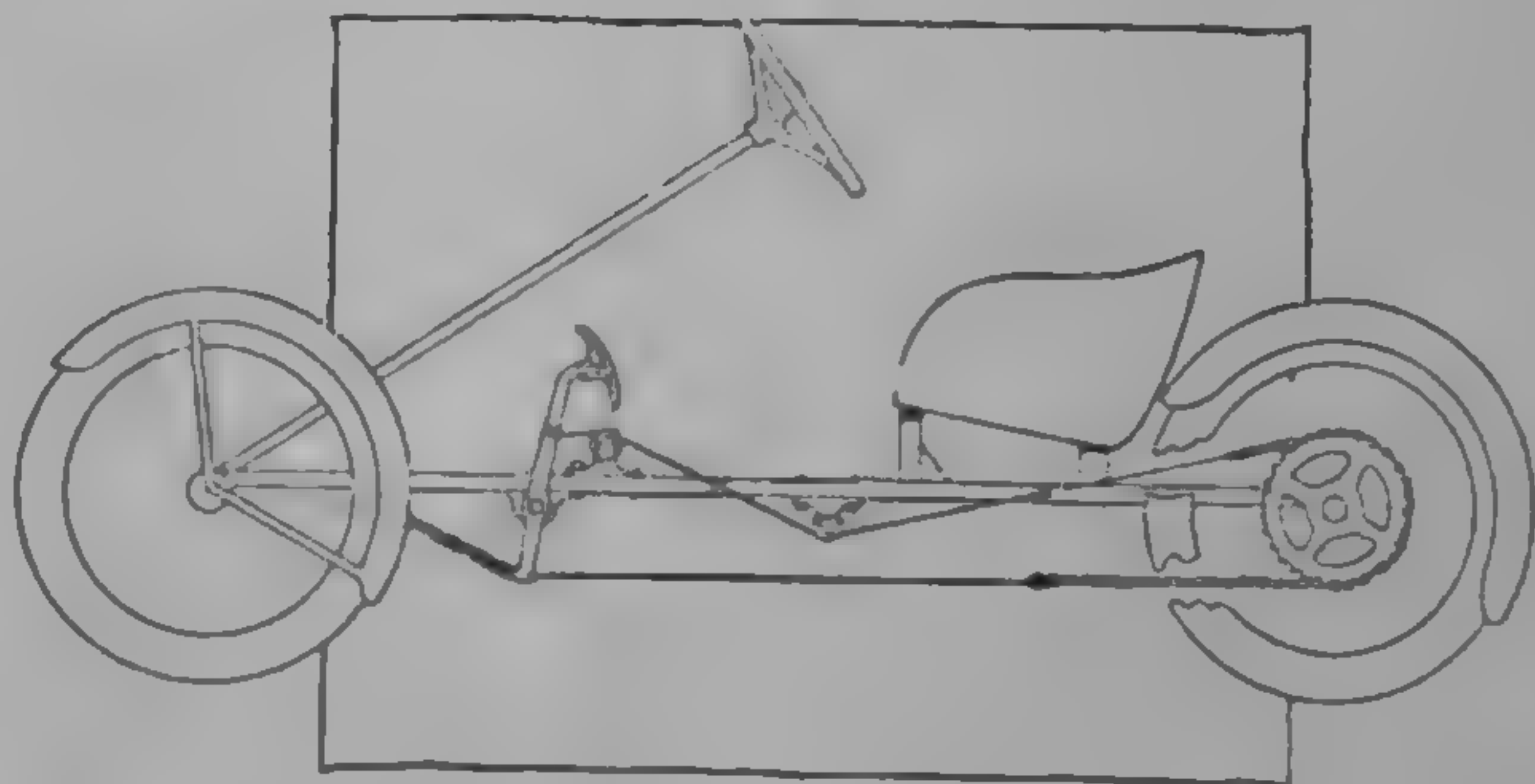


Illustration No. 3.—Another idea for starting up an Auto-Wheel scooter.

connected by a chain. Forward of the latter sprocket is a pedal which is connected to it by a short rod. It is pointed out that, owing to the fact that the knee can be brought well up, considerable leverage could be exerted on the pedal, consequently the runabout is propelled forwards and the Auto-Wheel started up.

CORPL. H. G. HARDING.

Pitcairn Ward, St. Bartholomew's Hospital.
London.

ANOTHER and perhaps simpler arrangement for starting up an Auto-Wheel-propelled runabout is shown in Illustration 3. Again a sprocket, only this time a large one, is attached to one of the back wheels, also incorporating a free-wheel device. A short length of chain runs over this, connected to the bottom and top of a pedal carried in a convenient position in front of the driver. When the pedal is pushed forward by the right foot of the driver a forward movement is given to the outfit; hence the Auto-Wheel is started. The connecting medium of the chain and pedal is a stout Bowden wire. X.Y.Z.

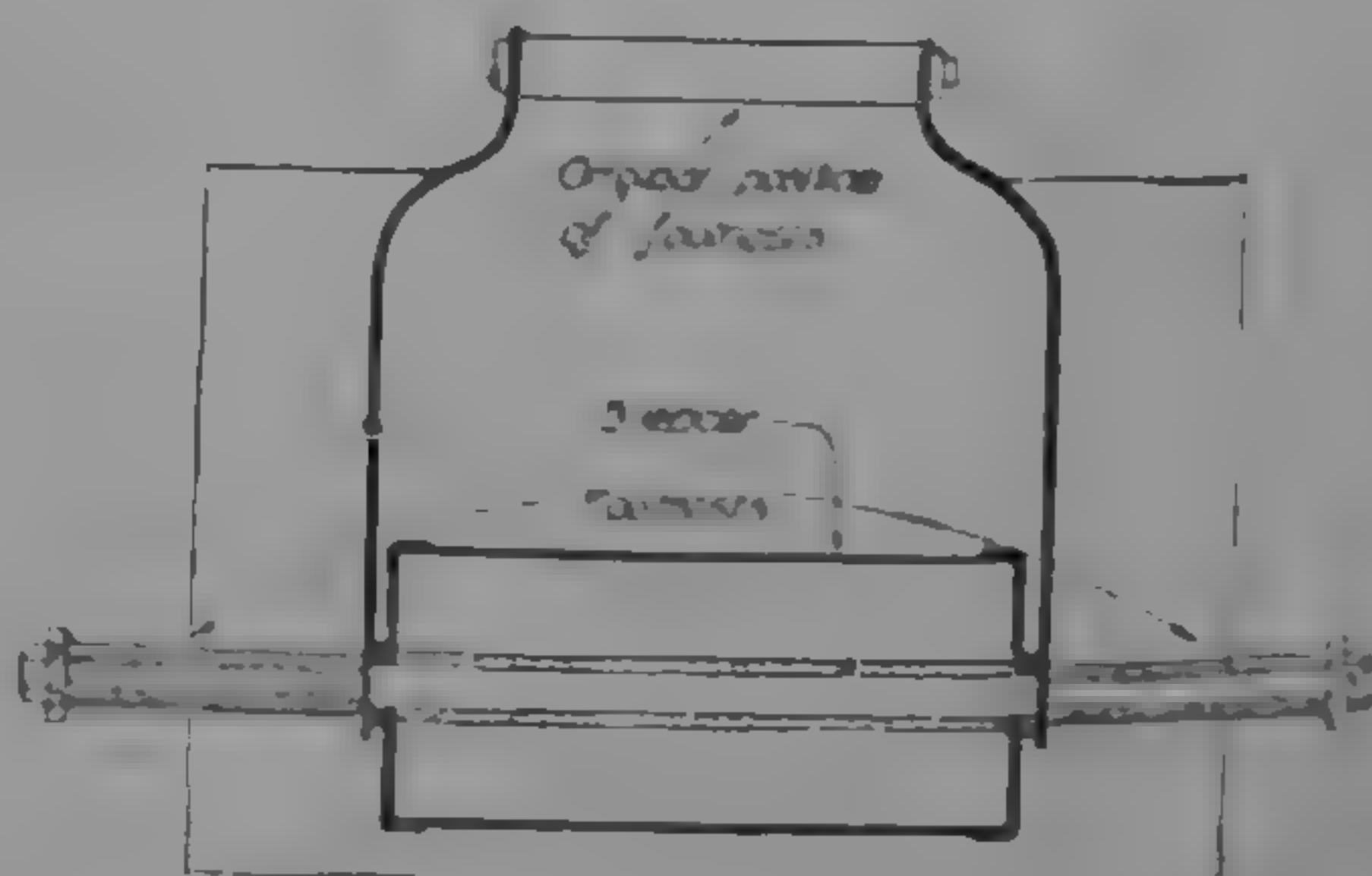


Illustration No. 4.—Lowering the front footrests of a New Hudson two-stroke.

To the Trade.

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Hints and Tips (contd.).

OF interest to those riders of two-strokes provided with a pair of footrests, the front pair being placed in a somewhat high position, is the following tip, which in particular refers to a New Hudson two-stroke, and is shown in Illustration 4:—The ends of the silencer are drilled and a hollow metal bar slipped through, the projecting ends

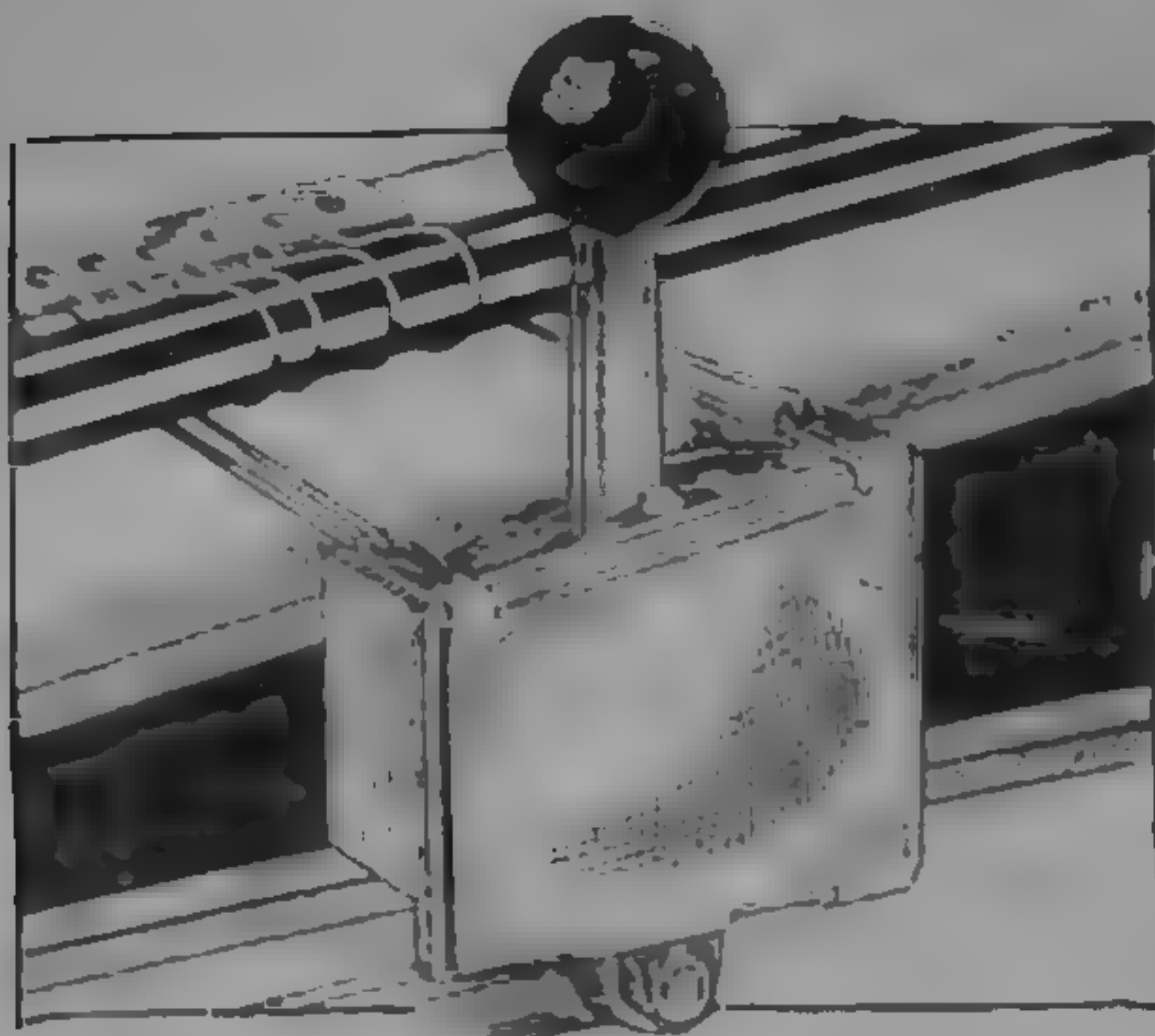


Illustration No. 5.—A neat method of attaching a pair of knee grips to the tank of an A.J.S. without interfering with the change-speed quadrant.

the gear lever rather obstructs the fitting of knee grips, and this is overcome in the manner illustrated. A bridge of wood was cut so as to fit over the gear quadrant. A pair of A.K. T.T. knee grips were then obtained, the right grip being cut as shown so as not to obstruct the working of the gear lever. The grip was then attached to the wood bridge by means of pins round the edges, the ends of the bridge being enamelled black, a strip of rubber solution on each edge so as not to injure the enamel of the tank, the pair of knee grips then being laced in position as shown in the illustration.

CORPL. H. HATFIELD.

88, Charlotte Street,
Fitzroy Square,
London, W.

IN Illustration 6 we have a method of starting up when paraffin or petrol-paraffin fuels are being used. This, of course, only applies when the machine is garaged adjacent to the house. Two tins are obtained: one to accommodate the float chamber and the other to accommodate a spiral which is formed in the petrol pipe immediately below the point where it enters the carburettor. The top is left open in each case and two emptying cocks are provided to drain away the boiling water which is poured into the two tins just before starting. F.A.L.

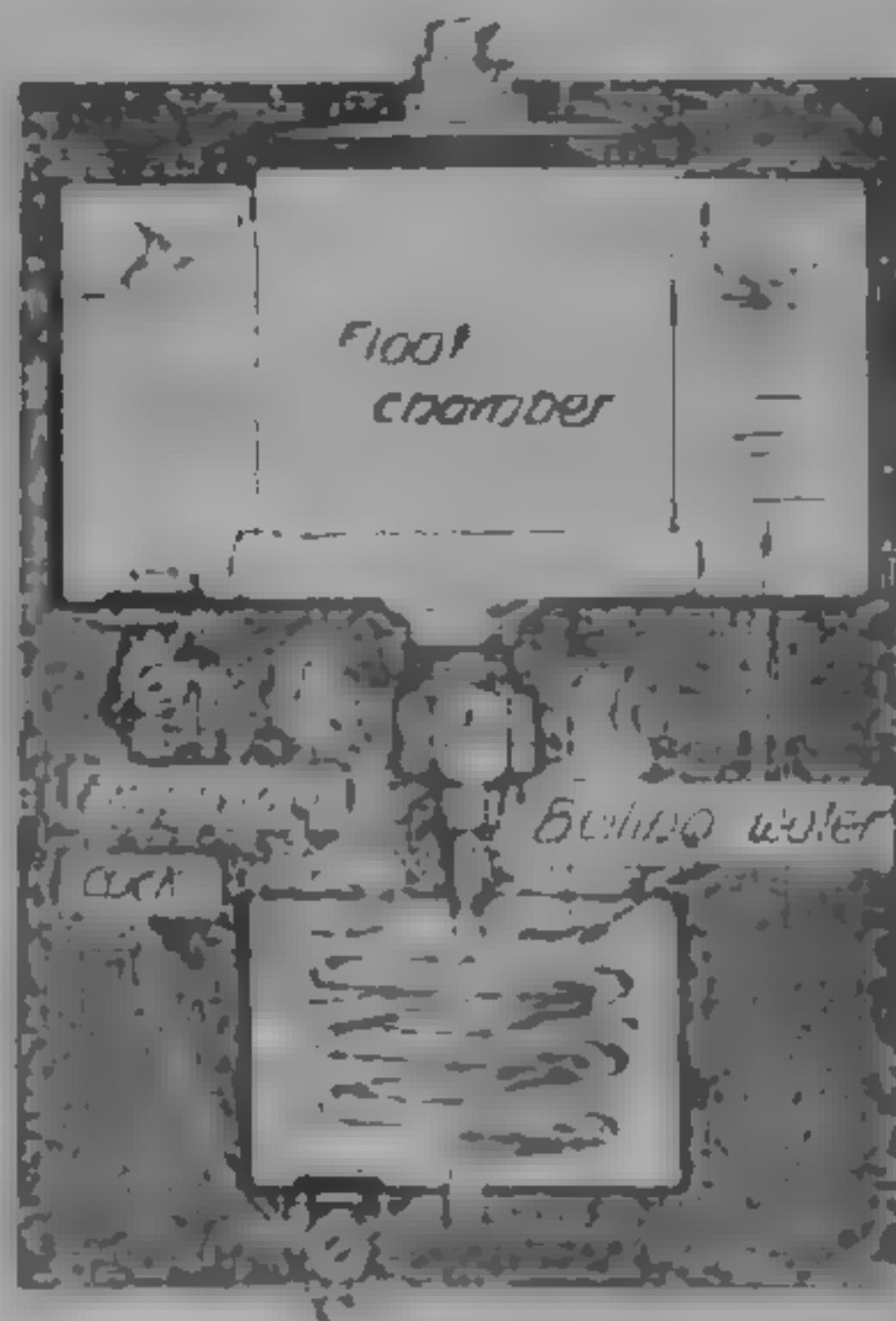


Illustration No. 6.—Heating up the carburettor by means of boiling water poured into two containers.

WE have all experienced the difficulty of stopping an engine by lifting the exhaust valves of a big twin-cylinder machine, and, indeed, this difficulty is often apparent on machines of lower power when insufficient leverage is provided. In Illustration 7 an excellent method of stopping an engine is shown. This consists of connecting up a switch arrangement with the exhaust valve lifter. It

will be seen that securely attached to the top of the exhaust valve lifter is a wooden block, which carries a spring-loaded metal peg connected to the switch terminal by an insulated cable; this in turn is secured to the wooden block by an ordinary wood screw. A very slight upward movement always permitted by slackness of the Bowden cable brings the metal peg into contact with the handlebar, and, consequently, the engine is switched off. A further movement of the exhaust lifter lifts the valves, the peg pushing down into the recess as shown in the illustration. (No name.)

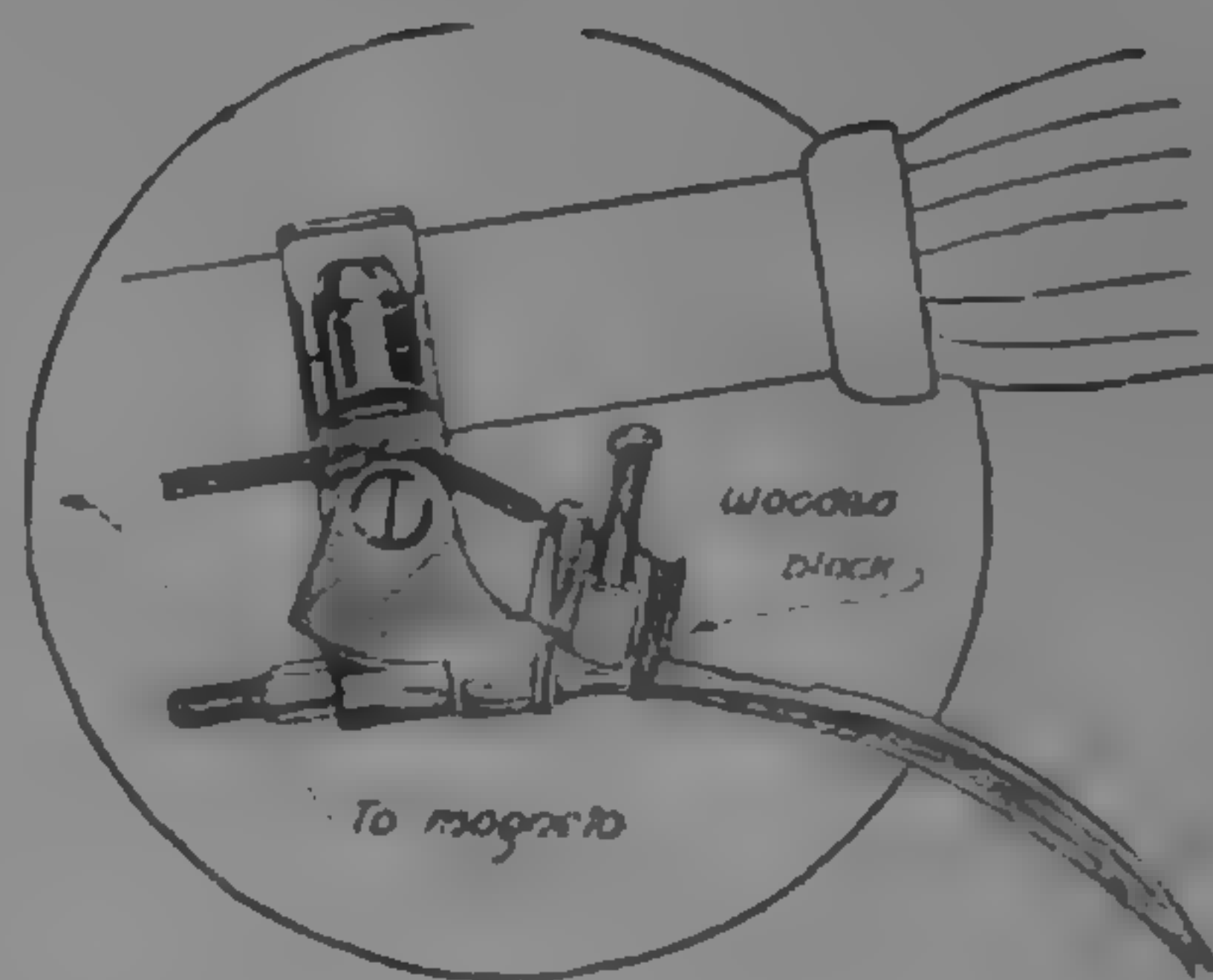
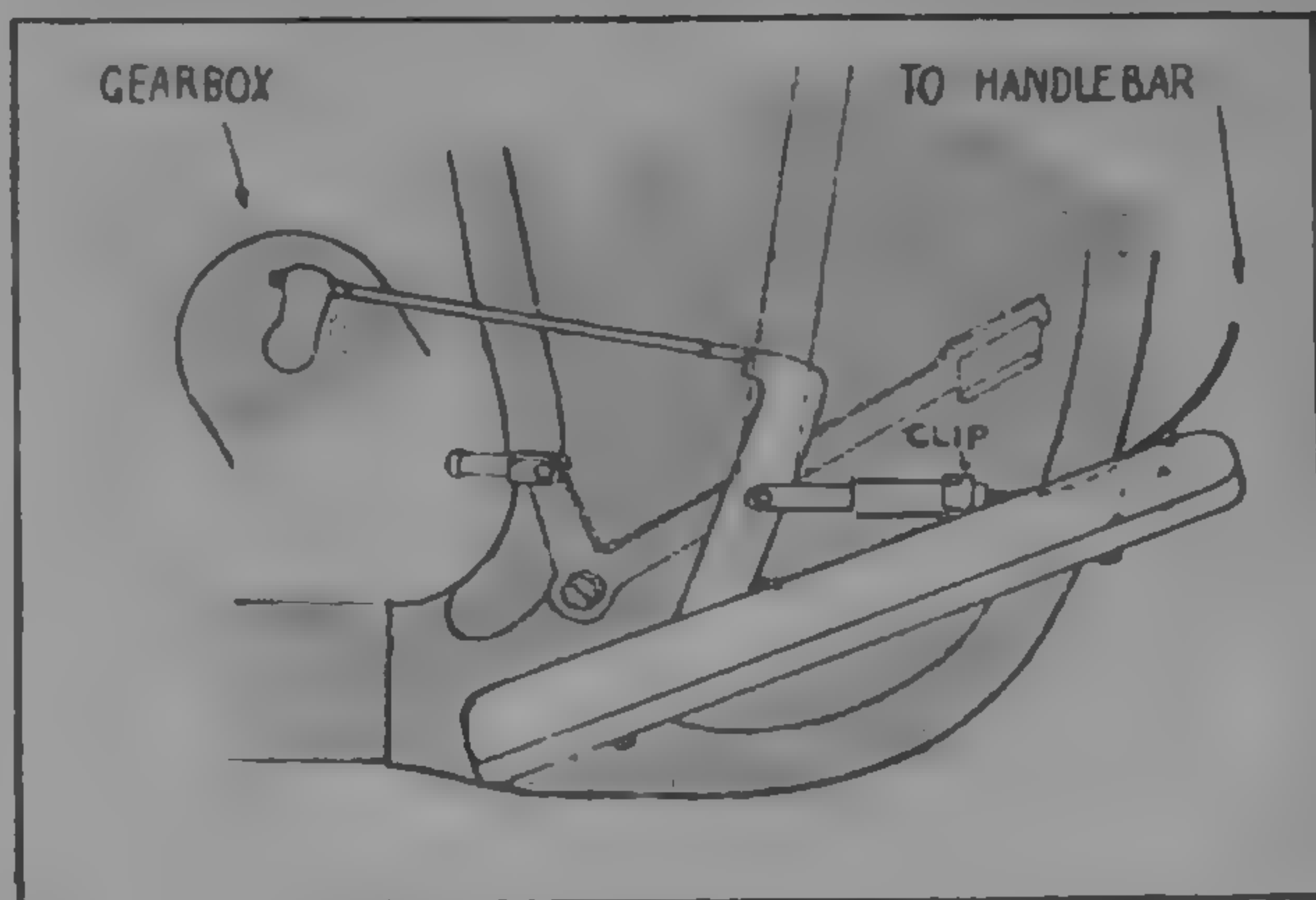


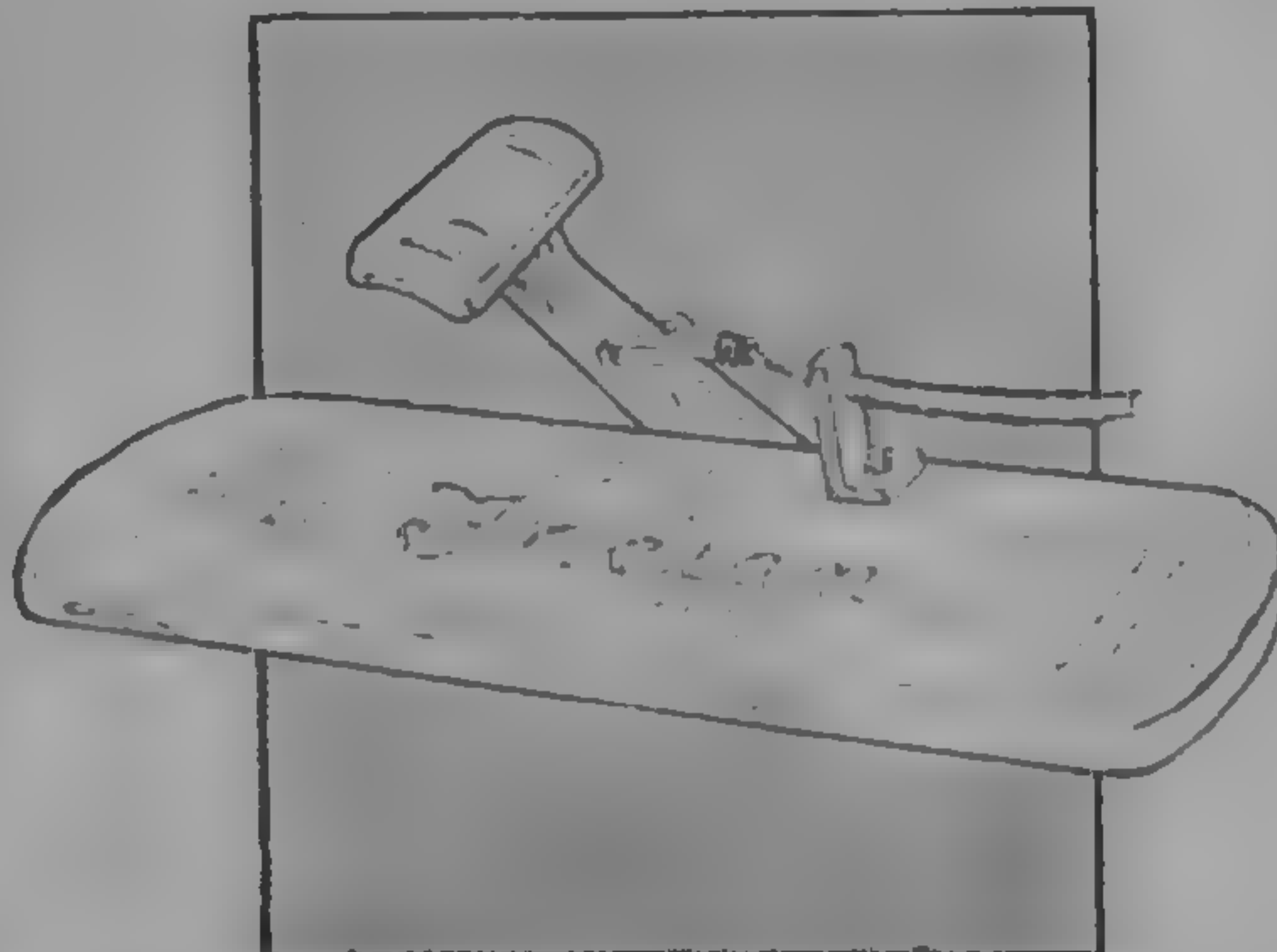
Illustration No. 7.—Combined exhaust valve lifter and switch. The full lift is permitted by means of a spring-loaded switch peg.



Illustrations 8 and 9.—Hand-clutch control and foot-operated handbrake.

The eighth illustration depicts a method of converting the usual control of an Indian clutch to hand control. This has been carried out by taking the lever used for operating the external contracting band brake and fitting it up as in the illustration. The secondary brake is then operated by foot by means of a car accelerator pedal and a length of Bowden cable. Not only does this render the secondary brake more powerful, but it is found that with the hand control an easier clutch engagement is permitted.

EDWARD ISAACS, Manchester.





A Diary of the Open Road.

I OCCASIONALLY hear from a friend who joined up in the early days, and was despatch riding right through the past winter campaign. His epistles are optimistic enough concerning the general state of affairs over yonder, but immediately the favourite

topic of bases is touched, one would think he was a chronic pessimist. What with "rotten frames," "beastly forks," "dud clutches," "vile hubs," and so forth, my friend seems to be in a veritable hot-bed of trouble. Generally, I greatly discount his complaints, because, in civil life, he was such a fastidious fellow over little details, but I think, from what he tells me, the hub grumble is fully justified.

It appears that all the hubs in use are of the ball, cup and cone type, adjustment being provided for by a threaded cup or cone, according to the design. In the case of the former, the cones are solid with the spindles, and both cups and cones are "radiused" to suit the particular ball size used. From what I have been told, it seems that about 500 miles is sufficient to wear a groove in both the cup and the cone, and that all the adjustment possible will not take up the inevitable slack, and the only real remedy is to fit new bearings throughout. Apparently, immediately adjustment is attempted, the ball is forced to ride on the edges of the worn grooves, and as these are irregular, obviating the slack in one position, exaggerates it in another. This I have tried to show distinctly in the sketches here reproduced, and as this must obviously occur with any type of ball bearing, I would suggest a hub design embodying a taper roller bearing of the Timken type. I believe this class of bearing, which takes both thrust and radial loads, is adjustable almost indefinitely.

IT is exceedingly gratifying to learn by the same letter that the manufacturers efforts at waterproofing the wheel bearings have been successful. With the winter approaching, my friend does not expect the least worry from this detail that was the cause of so much annoyance last year.

Waterproofing. In fact, he tells me, he feels rather convinced that more than half the complaints laid at the door of waterproofing "were due to the impossibility of hub-adjustment."

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I WAS very pleased indeed to see publicity given to Mr. Ernest Humphries resolution, dealing with what one might call "A British Manufacturers Co-operative Association." I think such a body is very necessary, and at the moment of national importance,

Cute Business.

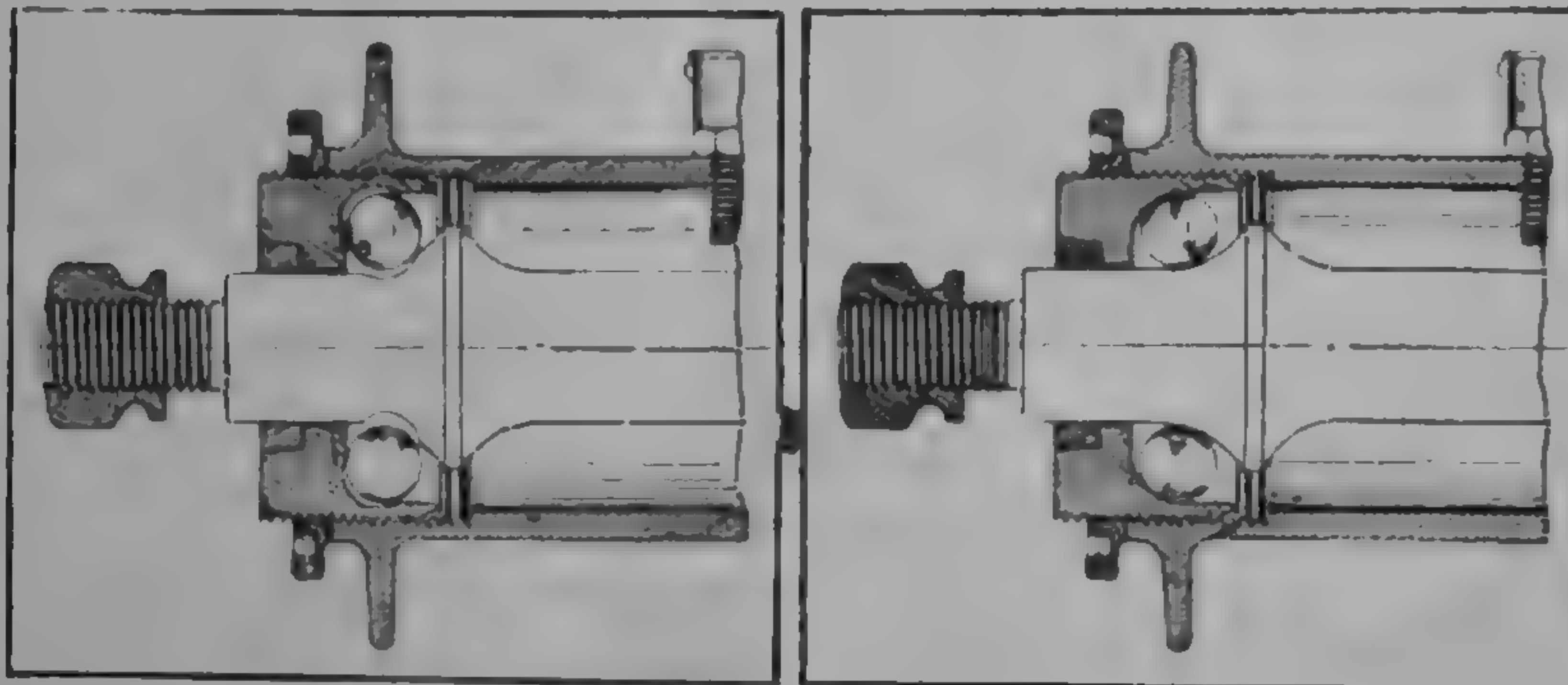
not only on account of the recent restrictions and the granting of export permits, but also because of the latest methods adopted by certain foreign manufacturers to obtain the overseas markets. I have just heard of an instance—and I have no doubt Mr. Humphries has knowledge of the case, too—where a foreign manufacturer has approached an overseas agent, who for years has held the agencies

and represented one or two highly-reputable English manufacturers, whose export trade has lately been compulsorily neglected. This foreign manufacturer's overture was bluntly an offer to grant the overseas agent a large territory sole agency—immediate deliveries in any quantity, and, I believe, special discounts, conditionally upon the agent exclusively handling this one make of machine. This, of course, is a very tempting bait to any agent

in the present straightened circumstances, and if these methods are continued there is little doubt, in some cases at least, the foreign manufacturer will be successful in thus securing an established representation and the English manufacturer's goodwill with very little expenditure. Some people, in some parts of the world, would class this as "Cute business," but to hit a man whose hands are heavily fettered with the chains of munition making savours much of the methods of those we are facing on the Somme to-day. It reminds me of the man who was too proud to fight, but, nevertheless, honourable enough to kick the other fellow when he was down. I hardly think manufacturers, unlike our Government, will acquiesce such effrontery and breaches of acknowledged business principles, but will insist on some form of reprisal, and any association as suggested, free from the foreign element in its entirety, should be capable of administering a certain policy that would speedily show the cute ones that war can be waged at home, and our home is still, unfortunately, their largest export market.

I DO not know exactly of what an ideal lubricant should consist, but I have been lately adding a
(Continued on page 174).

FAULTS IN HUB DESIGN.



(Left) In this view excessive wear is shown, to the sole object of illustrating the difficulty attached to the adjustment of this type of bearing. (Right) The usual cup and cone hub-bearing which, in order to withstand end thrusts, greatly forfeits the vertical load capacity; it is supposed to be adjustable, but in practice wear destroys the curvature of the cup and cone—the principle of the bearing itself—and makes this impossible.

INDUCTION DESIGN.

The Importance of Power Developed at Low Engine Speeds Dealt With.

IT is my purpose in this article to give the result of conclusions I have arrived at in induction pipe and inlet port design. I may be totally wrong in my theories, but at any rate they are the result of many years at the shrine of the goddess "Speed" and also furtive worship at the shrine of "Power and Reliability."

May I say here that it is my opinion that some "designers" (or in other words "copyists") get totally at sea in the difference there is between speed as such and power. Often enough engines are re-designed, and much ado is made of, say, larger inlet valves and induction pipes "giving so much per cent. greater horse-power." Now, if "allowing so much per cent. greater horse-power were claimed" I should agree. Higher engine revolutions are permitted, and more horse-power is obtained at this higher rate of r.p.m., owing to the larger induction system, but high power at low revs. certainly cannot be obtained.

This, in my opinion, was the cause of the failure of a well-known 7-9 h.p. machine to put up a show commensurate with undoubted excellence at a rather well-boomed hill-climb on a certain well-known hill. When a machine is harnessed to a sidecar and the combination has to round a hairpin bend with a gradient of, say, 1 in 3, it is usual to jog round at a speed of between 5 and 10 m.p.h. When, however, the bottom gear is in the neighbourhood of 10 to 1 this brings the revs. down to a very low rate, say 1000 r.p.m. or less.

Revolutions and Horse-power.

When it is considered that this type of machine is designed to give its full horse-power somewhere in the neighbourhood of 2700-3000 r.p.m. and also that the power curve is by no means a diagonal line, but more resembling an inverted semi-circle, it can very readily be understood why this type of machine will pound along with sidecar at 50 m.p.h. on the level and yet come to a standstill at a hairpin bend that a decent 3½ h.p. would take without any trouble.

I will now endeavour to give my explanations of why this takes place. We all know that our mixture that is fed to the engine is atomized petrol and air, and we also know that the petrol is atomized by the velocity of the air over the jet. A point that is not so generally thought of, although perfectly obvious, is that it remains an atomized mixture just so long as this velocity is kept up; reduce the velocity and the atomization is nil. Now, to put the matter very clearly, we will suppose that the induction system of machine A is designed for full power at 3000 r.p.m., and that of B for 1500 r.p.m. Other things being equal A will develop about twice the power that B

does, because it can usefully use twice the amount of fuel. (This is putting it crudely, but, I trust, clearly.) This being so it is only reasonable to suppose that the makers gear the machines according to the horse-power developed. A machine developing about 15 h.p. at 3000 revs. is probably, if a three-speed motorcycle, geared 3.3, 6, and 9 to 1. The other motorcycle developing only 7-8 h.p. at 1500 is geared 4.25, 8.5, and 11 to 1. Now what happens when we get to this hairpin bend?

Power at 1000 r.p.m. of Great Importance.

On a gear of about 9 to 1 the revs. are in the neighbourhood of 1000 or less. You cannot get full revs., otherwise the speed of the motorcycle would be too great to get round the bend, so you close down the throttle and your speed drops. You suddenly find that you need more power, so you open out, giving the engine the benefit of your lovely and large induction system. The load on the motorcycle, however, is too great for it to accelerate, and it is therefore a question of slogging. As the revs. of the engine are not sufficiently high to use the large induction system to advantage, you either close down the throttle and change to the two or three horse-power which the engine develops at about 1000 r.p.m., or leave the throttle open, in which case the engine coughs itself to a standstill, because, owing to the low velocity in the induction pipe, perfect atomization is totally impossible.

Take the case of the other motorcycle now. It will probably only do about 35-40 m.p.h. on the level, but we approach the same hairpin and change down to bottom gear, 14 to 1. We can give the motorcycle full throttle and let it turn over at full, i.e., 1500 r.p.m., and yet the machine will only be doing about 8 m.p.h. We therefore have the outfit crawling round this hairpin as surely as possible, slogging its way up under its full power.

Summary of Conclusions.

Thus we see that it is extremely difficult for designers to produce an engine capable of sweeping the board at race meetings, doing a great number of miles an hour and yet at the same time being able to haul a heavy load uphill at a slow pace, and, of course, vice versa. So if two such machines as described are seen to arrive at a hairpin bend and perform just as described above, do not say that the motorcycle that fails to get up is not so powerful as the other. Merely reflect on the wisdom (or otherwise) of those who produce a machine capable of more than trebling the legal limit, and yet being unable to haul its one-time dignified owner up some of the hills to be met with in perfidious Albion.

ARGUS.

A21

The Manufacture of a Motorcycle Power Unit.

[TWELFTH SERIES.]

How a Cylinder is Ground and Machined from the Rough Casting to the Finished Product.

ALTHOUGH a cylinder may be said to present one of the simplest parts of a motorcycle engine it is remarkable the number of processes that go to make the complete finished article. Notwithstanding this, there seems but little difference at first sight between the rough casting and the finished cylinder. (Illustration 1).

The rough casting is first carried to a lathe known as a capstan, with which several operations are carried out. In the foreground of the illustration (Illus. 2) will be seen, like guns protruding from the barbette of a battleship, the various grinders which are brought into operation successively. The first operation consists of rough boring, the second the finished boring and the third cutting the chamfer on the mouth of the cylinder, which facilitates the entry of the piston rings. Whilst in the same position the cylinder base and spigot are faced.

Turning the neck of the cylinder, i.e., that part of the cylinder between the base and the bottom radiating fin, is the subject of the third illustration. Incidentally, it is held in position by an expanding mandrel being inserted in the bore. It is then revolved against the cutter seen on the right.

The cylinder is now carried to a drilling machine and is clamped by its base in a jig which is clearly shown in Illus. 4. It will be seen that the drill passes successively through four guides or holes in the jig, perfect accuracy being thus ensured. The four holding down bolt orifices are thus drilled.

The cylinder is next carried to another drilling machine, is clamped by the base, and the compression tap orifice drilled and threaded. Incidentally, the hole is of sparking plug size and can be used to accommodate a second plug when two-pole ignition is employed. (Illustration 5.)

A capstan lathe is again used for machining the

valve seats and guides, boring and screwing for the inlet caps. The six tools mounted in the head of the capstan lathe, four of which can be seen, are for (1) drilling valve guide orifice, tapping and boring for valve cap in one operation; (2) a duplication of the previous operation, but with a finishing tool; (3) forming the correct angle on the valve seats by means of a special cutter; (4) tapping the valve guide orifice; (5) tapping the valve cap hole, and (6) turning the flat face on the cylinder to ensure a gas-tight joint for the valve cap.

The manner in which the thread is turned on the exhaust port stub is shown in Illustration 7. A revolving tapping tool can be seen just about to descend on to the stub.

The inlet ports are threaded as shown in Illustration 8. The cylinder is again mounted in a jig so as to ensure that the inlet ports are exactly the same distance from the cylinder base.

Grinding the cylinder bore dead smooth is the subject of the next operation, as shown in Illustration 9. The cylinder is mounted in a cradle which rotates slowly, whilst a small grinding wheel, which is shown about to enter the cylinder, runs at a very high speed in an opposite direction and automatically traverses the length of the bore, removing a very fine amount each time until the bore is dead to gauge.

Illustration 10 shows a gauge being inserted in order to test the bore. An interesting note here is that Messrs. J. A. Prestwich and Co. were the first manufacturers in the automobile industry to introduce grinding of cylinder and piston to diameter.

All operations have now been finished with the exception of grinding the cylinder neck to give a finished appearance (Illustration 11). The cylinder is then viewed and placed in the stores.

CROSS-COUNTRY COMMENTS *(Continued from page 172).*

tin of "Oildag" to every gallon of Price's Huile de luxe, and I must say I am exceedingly satisfied with the results. The other week-end, as the weather was

A Good Cylinder Lubricant.

extremely uninviting, I remained indoors, and after pottering aimlessly about the house and getting into everybody's black books, as an idle fellow inevitably does, I set to work and dismantled the cylinders of my little twin "Dug."

I have always prided myself on my ability to "run in" an engine judiciously enough to obtain the desired and beautiful cylinder finish so very closely allied with engine efficiency. Friend "Oildag," however, has shown me what a good cylinder surface really looks like, and I am no longer conceited. Those two little cylinders possessed surfaces indescribably smooth, and the stroke length appeared to be polished and as scratchless as a 4.5 photographic lens.

I feel convinced that this graphite compound—or whatever it is—has a remarkable effect on the cylinders, but I do not know if the bearings are injured in any way. I should think not. I notice, however, that, previous to using "Oildag," the crankcase presented a fairly respectable appearance, but now it is simply filthy, and the mixture seems to leak from innumerable yet untraceable places. This seems to

suggest that "Oildag" carries the lubricant to nooks and crevices previously inaccessible to the crude oil, as, in a similar manner, borax or flux carries the spelter in brazing a joint.

My experience has proved "Oildag" to have a very beneficial effect on the cylinder, and my next new engine will be given a liberal dose before serious work is attempted.

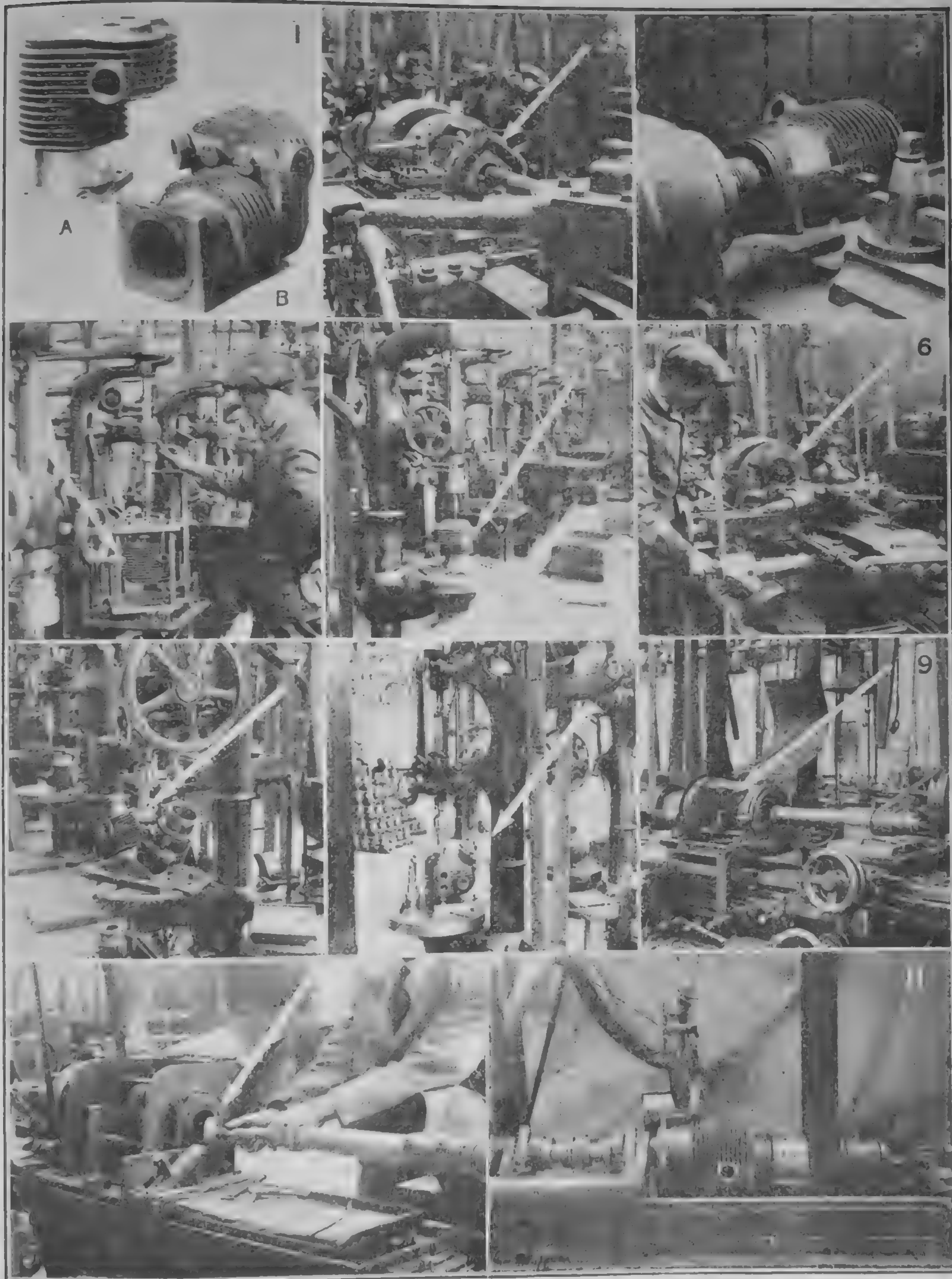
IHAVE always had the impression that the ostrich was Nature's fastest bird afoot, but I have never had the faintest idea what the maximum speed of which this bird was capable. Kansas City, however, recently decided the matter, and the population was

An Unusual Match.

treated to the unusual sight of a spirited race between a young ostrich and a motorcycle. One of the City Police Force Squad paced this seven months old bird, which, I am told, was specially trained for the work—why and how I am not informed—on a 7 h.p. Indian for nearly a mile and a half on one of the most fashionable city thoroughfares—Cliff Drive. It was an exciting race, till the speedometer registered 40, when the motorcyclist accelerated and finished an easy winner, to the astonishment and dismay of the ostrich, at over a mile a minute.

COOEE.

MACHINING A CYLINDER.



Showing the various processes in the completion of a motorcycle cylinder. The figures are referred to on the opposite page.

THE ORIGIN OF THE



Manned by the men of the Motor Machine Gun Corps, the "Armoured Cars, Heavy," soon received a particularly apposite name. In the real article. Can it be wondered, therefore, that these land ironclads should be dubbed immediately "Tanks" by their motorcyclist crew of "Armoured Cars, Heavy," and hence the word became world famous. Our artist has depicted the scene of the first engagement in the picture.

THE WORD "TANK."



ly apposite name. Look at the modern motorcycle tank with its upturned front and down-turned end, and then at a photograph of by their motorcyclist crew? Official phraseology, unusually apt to accept popular nomenclature, seized on the handy abbreviation of the first engagement as it might have appeared to a super-keen motorcyclist who formed one of the crew of a leviathan not in the picture.

WOMAN AND HER MOTORCYCLE

A Feature for Feminine Riders

THE LETTERS
OF
BOADICEA.

A CAUSERIE
OF
THE WEEK.



PAMELA, chère—I am enchanted to hear that you have done the dark and desperate deed, and the machine is really and truly reposing in that rapturous little garagette of yours. How wise of you to get a sidecar outfit! You will find it so useful for shopping, and, of course, it is much easier to tootle a sidecar through the traffic than

a solo machine. Do have a care at first, though, especially when there are policemen about. They are so inconsiderate to ladies, I always think. And if you do have a wee accident any time—I know your highly-strung nature—be sure to bluster for all you are worth the very moment you can get your breath. Once make the person you have run into thoroughly ashamed of herself (if it is a him and young, you need not trouble), and you can do simply anything with her. It is all a question of who gets in the first swear.

Now you are a real truly-truly motorist and begin to sit up and take notice. I am sure you will be ravished to know that the Scottish Women Motorists' Association have actually held their first official meeting in Edinburgh. This is important, because, like Eve, the S.W.M.A. is the first of its kind, and we hope will enjoy a publicity as lasting as that of the dear fig-leaved lady herself. When I first heard of the Association I thought, strictly between you and me and the Petrol Committee, that it would promptly fizzle out, as so many of these ducky little schemes do nowadays. But the S.W.M.A. is quite on the inside edge and firmly established. Thank you, with a dinkie little committee all its own and officials galore, with any number of startling initials trotting after their names. I see no reason why it should be confined to Scotchies, though, do you? Why not let in the rest of us and call it an all-British product? Patience, Pamela, my periwinkle, that hoity-toity Fitz'dyot woman will never let slip such a chance to become a chairmaness all for nothing. If we haven't got a vastly superior British women motorists' association in less time than it takes to soot up a cheap plug, I'll be very much surprised. Fitzidyot will never rest till she has knocked the Scotties into a pothole.

By the way, I happen to know that the woman has actually given up her housemaid and gazetted a general instead (that huge house! Poor woman!) so that she can keep her machine in spite of the war and one thing after another putting the lid on motoring, and everything. I wonder if my motorcycle will ever supplant Mary Ann, Pamela? It may come to that. But it shows how keen women are on



the pastime, if even a stiff-necked bussy like Mrs. F. prefers to keep her motorcycle rather than that second maid she was so proud of. You and I will stick to our old irons, Pamela, in spite of everything short of a bomb through the garage roof.

Talking of war and women, I was reading an article about 'em both the other day, and oh, Pamela! it said such a lot of grand, limelighty things about the part we are taking in the general hooroosh that it positively made me weep to read them. The things we are doing you'd never believe. Helping to make motorcycles and all! Just fancy, Pamela, you have only just taken up motor cycling, and thousands of women have never even thought of doing such a thing, and yet women are helping to turn out machines in scores for the Government—isn't it positively lovely of them? Thank goodness, after the war women will at least be able to ride machines made by women without being stared at and called unladylike by a lot of male and female grannies who would not have us do anything but knit and flirt and faint and spout scandal all day long. You must excuse Boadicea, but she feels very strongly on this subject.

But it is comfy to think that we need no longer be either skivvies or guvvies and no other choice, if we want to earn our living, isn't it? In the motor trade alone there must be scores of openings for women—tyre making, coach building, acetylene welding, re-

pairing—you will know the merits of this trade, Pamela, when you have blown off a cylinder head ten miles from anywhere and repaired it with a hatpin and three dead leaves—and oh! scores of others. Last, but not least, comes the nimble chauffeuse: a job which you or I, as motorcyclistes, could qualify for as easy as snip. Truly, oh, Pamela, thou pert one, the hand that rocks the cradle rules the world nowadays, though I fear there is not much



cradle-rocking going on at the moment: the kiddies have to look after themselves while mother twirls the guileful starting-handle instead. But it must be a nasty sea-sick kind of motion anyway, and I do not think the babes will miss it.

All this! And only a year or so ago we were just pussies and nobodies, and now we're positively the props of the empire! Do you feel like a prop of the



Woman and Her Motorcycle (contd.).

empire, Pamela? You can be one any day just by taking out a dear wounded "loot" in that new outfit of yours. This is the pleasantest way of being a prop I know.

I have been reading about the American motorcyclists lately, and I simply can hardly see out of my eyes for envy. Oh, to be in happy New York, where fuel flows for 10d. a gallon and everybody motors all the time! The rage in the feminine motor-cycling world there now is a mount so small that the bachelor girl living in digs can accommodate it in her bedroom, I hear. Personally, that is the last place in which I should care to have my machine, clean though I flatter myself I keep it. Perhaps American ladies never ride in the rain. Their mounts must be rather marvellous altogether, as they weigh about 45 lb., have 18 in. wheels as opposed to our 22 ins., and yet develop 7 h.p.! I should like to possess one of these powerplus lightweights, especially as they cost but £22.

These are mostly used by the American business girl, however. I gather, and the domestic married woman prefers a little closed electric carriage, which she drives around herself. Well, it takes all sorts to make a world. A common sight in any big American city is row upon row of these little vehicles drawn up diagonally to the kerb, while their fair owners haggle over the Sunday mutton inside the "store." The speed of the limousines rarely exceeds eight miles per hour. Oh, Pamela!

A dreadful thing happened to me the other day, Pamela. My nerves have been all wobbly ever since. I have hardly dared to put hand to handlebar for days. It was the day of that drefful fog, and just for a lark I bet a friend I would ride through London in it, and come back without having sent anybody to heaven or myself to—well, you know the place I mean, dear. To prove I had been, I was to bring back one of the luscious sweetie cakes with the cream lubrication that can only be got from one place right up in the heart of the gay, gay city. Well, I started out, but there wasn't any gay, gay about the city at all. It was all gloom and murk and panic-stricken people, and poor taxi drivers who had had recourse to the national curse to keep up their courage. The national curse ran into me quite a number of times that day. To make matters more charming than ever, when I got into Oxford Street, my horn bulb got overheated, and refused to happen. I was getting tired, and thought I would lose the bet gracefully (only a pair of gloves, and you know you always have to say a size smaller than you can possibly wear). So I drew up to the kerb, and went to get a bun at a little cakey magasin. Would you believe it? In the window there was a trayful of the very cakes I had sworn to bring back or die! So I disordered the bun, and sat down and had a dinkie little tea, all by myself, before I started home with my trophy. When I went out—Pamela! the bike had gone! Disappeared! Swallowed up! Like Jonah.



Of course, I flew to the telephone, and made Scotland Yard jump up and down on all fours like castanets, and just to hasten up matters I told them I had reason to believe the thief was a German spy. Then I went in and had another tea (Oh, Pamela! how dear is the little necessary crumpet now—a d a y s!), because I couldn't pretend I had been through London so soon, and then wended my way home. There, at the front gate, was my machine! Such a nice man waiting to see me and explain how he had taken the wrong machine by mistake, and had found my address on the saddle bag, and hoped I wasn't very angry with him, and would I come to dinner one night just to show I wasn't—well,

he was really very nice, Pamela. (By the way, he has blue eyes; what a pity I can't introduce you, dear.) So that was all right, and I went in and claimed my bet, and got all the kudos I could for my supposed ride through the awful dangers of fog-ridden London. You see, they didn't know about that nice man waiting outside. What a mercy he came up just at the same time as I did!



But oh, Pamela, what do you think? My bettee—he has a really good taste in gloves, and he made such a tactful mistake and got them a size too large after all—offered to ride the machine round to the garage for me, because I said my nerves were a little shaken by my trying ride. And he never came back and we waited and waited—it was terrible, Pamela. And then, about half an hour later, ting went the telephone, and there was Scotland Yard hanging on to the other end, all waiting to speak to Pamela.

"We've caught the man who stole your machine, miss," said a stern, iron, Duke of Wellington sort of voice. "What!" I gasped. "Caught him red-handed just breaking into a garage," went on the voice. "He'll be detained a bit while inquiries are made about him, miss. You'll have to give evidence on both charges, miss, if we can prove alien nationality. . . ."

But I heard no more. I let go the receiver, and fainted dead. Oh, Pamela! It was my glove friend!

Pray for me when I am dead.

BOADICEA.

A "HALF-PRICE" SALE

Messrs. Burberry's, of Haymarket, London, are again inaugurating their half-price sale, which proved such a success last year. The sale, which opens on 1st January, includes both men's and women's garments of every kind and size, suitable for all occasions and pursuits. In addition to weatherproof overcoats of Burberry's many exclusive designs and materials, there are a large number of gowns and completed suits.

Much of the stock is to be sold at one half—and in some cases at less than one-half current prices. Other portions are marked down to the very lowest figures that the cost of production justifies.

AN INTERESTING SPRING FRAME.

Spring-loaded, Threaded Shock Absorbers Neatly Housed—Entirely New Application.

THE method of fore and aft springing herewith illustrated is an attempt to escape from the conventional method and to produce something which shall present a much better arrangement than is usually the case. Attempts at springing a motor-cycle frame and forks are usually characterized by an unsightly appearance, however useful they may be in other directions. It is generally conceded that the ideal spring frame is yet to be discovered, and I venture to hope that the design now dealt with is not

pitch equalling two diameters of the worm. The method of separating the two springs is clearly shown in the front fork design, where the lower and larger barrel carries the main spring.

An alternative design of front fork is shown in Fig. 2, and is similar in action to the well-known Triumph forks, but this action is not recommended. In this case both springs are contained in the one barrel. In all the designs shown the thrust of the worm is taken by the ball bearing, but a slight alteration will enable it to be self-contained in the axle. (See sketch.)

In the case of the front forks the forward ends of the levers are braced across with a very wide plain bearing nearly 6 ins. in length, so that lateral rigidity is completely secured. Each spring, viz., shock absorber and damper, is separately housed. There is no reason why the similar levers at the rear could not be so dealt with as regards the upper stays, as this is already done in the case of the lower back stays. In this case the connection would require to be arched around the rear mudguard.

A special feature of the design is its adaptability for adjustment, and this feature, though not shown in the drawing, can be incorporated in the front forks, although it is questionable whether it is so vitally necessary here as at the rear. Few, if any, attempts at evolving a spring frame have dealt with the matter of adjust-

ability to varying weights of riders, and very few, I believe, have endeavoured to conceal the spring.

The design of frame is by no means confined to the one shown—I refer to the rear portion. There are one or two other ways of adapting the arrangement which occur to me which might offer advantages. Referring to the matter of differentially-pitched worms, this is no doubt one which would require some experimenting to get the best results, and I think that possibly herein lies an advantage which would enable a level seat to be maintained, despite the unevenness of the roads, which is, of course, the ideal sought for. The device would be a very neat arrangement if used as a substitute for the Cee springs on a sidecar, and unquestionably it would form a very efficient shock absorber for a motorcar in addition.

X.Y.Z.

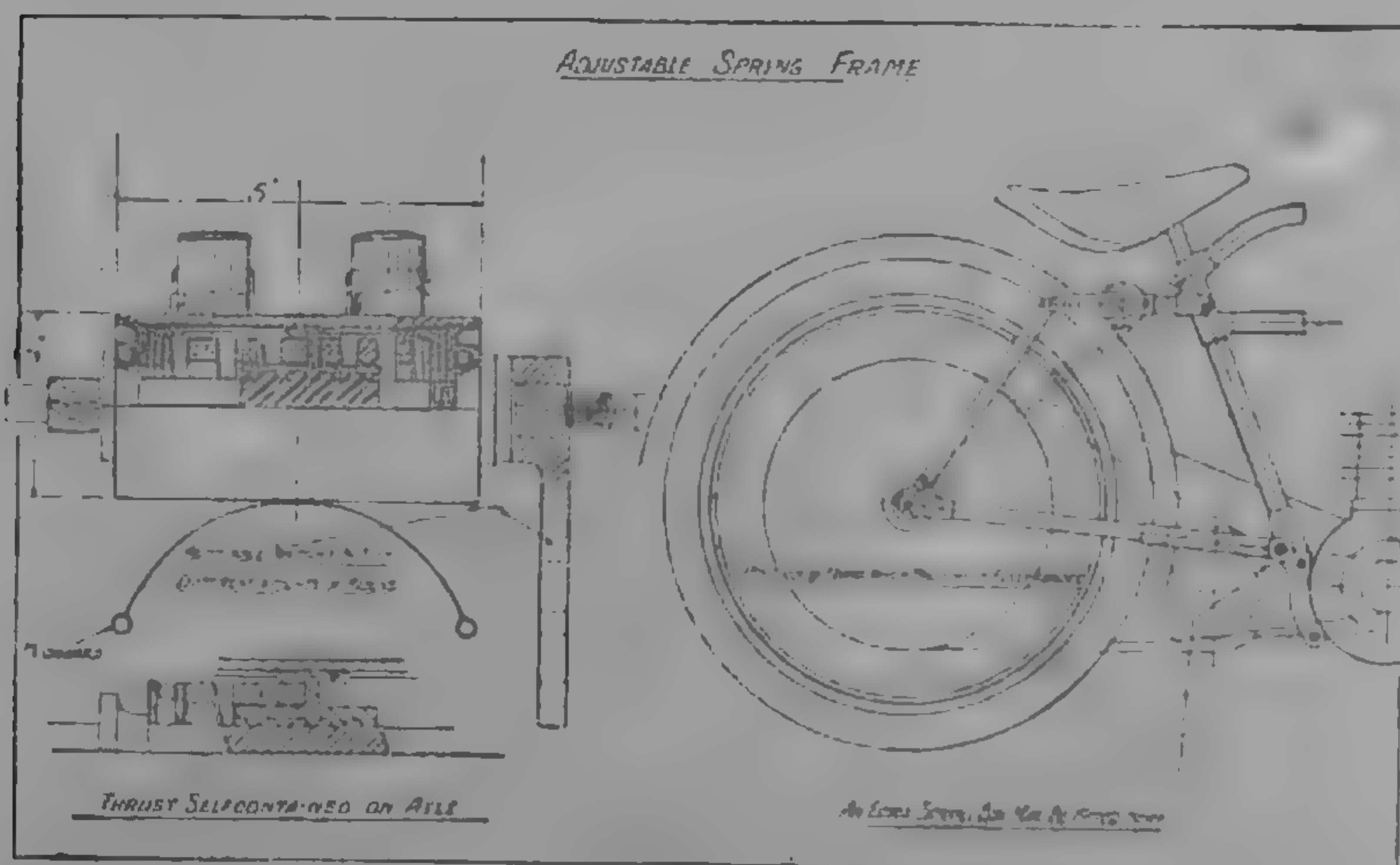


Fig. 1.

entirely without merit. It certainly appears to possess all the virtues that a spring frame should have, particularly that of lateral stability, which is provided for by adjustable ball bearings at the two most important points, and which could be of much larger diameter than those shown if necessary: whilst in the matter of neatness of design, due to the method of concealing the springs, it does not leave much to be desired. Lubrication is well provided for, as the barrels carrying the springs may be filled with grease permanently, and lateral stability is a very strong feature.

Referring to Fig. 1, which deals with the rear portion of the frame, it will be seen that a barrel-shaped casting is located just under the saddle and carries two helical springs, one on either side of a travelling nut mounted on a very coarse-pitched screw or worm. The nut is splined to the barrel and free to slide axially. To the ends of the wormed axle are attached levers with adjustable positions, and these are hinged to the rear stays in any suitable manner.

The heavy spring carries the load and absorbs road shocks, whilst the lighter spring deals with the rebound. There would, of course, be a good deal of friction on the worm, and this should be very helpful in preventing bouncing. An alternative, and, I think, much better arrangement, would be to contain the main spring in one barrel, say, under the saddle, and the damper spring in a similar barrel near the bottom bracket position or vice-versa. Further, I should suggest a worm of a rather quicker pitch for the damper spring in order to better damp out the reaction of the spring. I think there is something in this idea of different pitches on the worms, both of which would have to be in the neighbourhood of the

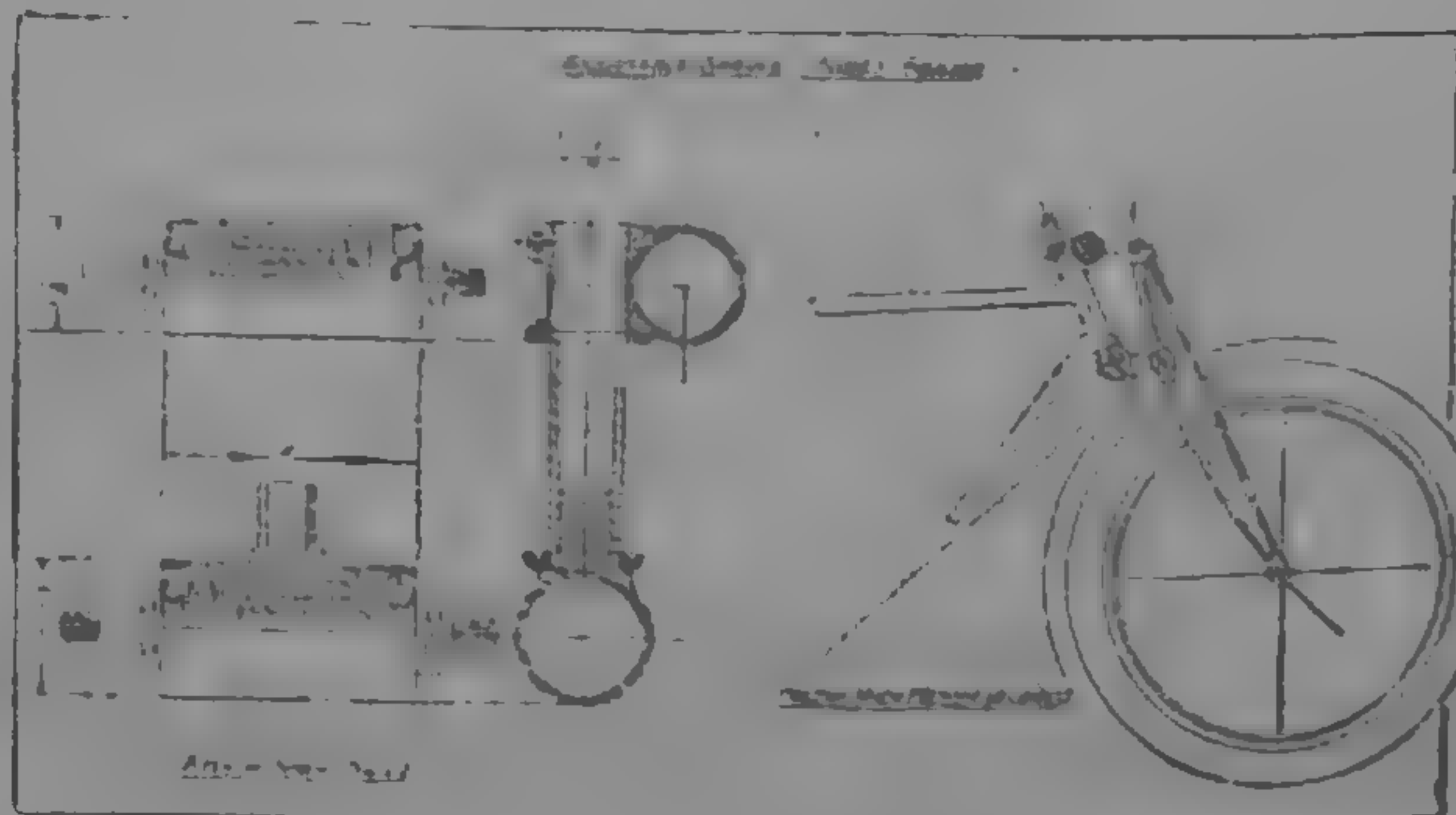


Fig. 2.

a Hymn of Hate -



Sundry Scribbles by the Sub.

THE familiar man-in-blue, of week-end trapping and danger-to-the-public fame, is represented in France by three types of men, similar in their profession but slightly more polite in their remarks. I refer to the Regimental Police, the Military Police, and the Mounted Military Police.

Though their uniform is different their methods are the same. In the happy days of peace I was fined in all parts of the country for "speed," "dangerous driving," and "noisy silencers." Early in the war, as a corporal despatch rider, I was "crimed" for such evil offences as "riding on a train without a pass." (The fact that I had been given an afternoon off, and was merely going to Richmond with a "lady friend," did not alter the case.) But now that I am an officer, and the police still belong to that remarkable body known as "Other Ranks," I am treated with a little respect.

We are, of course, still enemies. A bitter hatred, dating from the earliest days of my motorcycling career, is not much influenced by a change in the colour of the uniform. Instinctively I dislike them; and instinctively, but politely, they dislike me.

There is a gentleman in my own division—a smooth, smart, sly sergeant. He is the most immaculate of men, and it is this very quality that annoys me. As I trudge wearily and muddily from the trenches, I pass him at the crossing of the roads. He diverts the traffic with a wonderful skill—chaos and confusion would reign if he were away from his post. But we have met before somewhere—whether in connection with a two-pound fine or a five-shilling tip, I forget. He has cost me money, and he is down for "treatment."

The Regimental Police are, in reality, nothing more or less than "Special Constables" at the Front. They have been drawn from infantry battalions, in the main, and are mostly men of long service and great age. I treat them with kindness—for, after all, they are only amateurs. It is the Military Police and the Mounted Military Police who are so closely related to the "arm of the law" at home.



"A two-pound fine."

The sight of a Regimental policeman on traffic duty is most humorous, provided one is not on a motorcycle or car. He stands in the spot where he is most in the way, and obviously braces himself for the shock of an inevitable collision. But motor drivers in France are kind-hearted men on the whole, and they do their best to avoid him. Considering the enormous risks run, it is truly remarkable that the casualties are so few.

It is when he has been "confirmed in rank," I understand, that the Regimental policeman is awarded a red-and-green flag by day and a red-and-green lamp by night, to assist him in the execution of his duties. And the first few weeks of this promotion are trying times to motorcyclists and road users in general. He stands in his position of insecurity and turns his lamp so that the traffic on all roads sees partly red and partly green. Being of optimistic natures, everybody approaches at speed, and the unfortunate policeman finds himself in the centre of a mass of converging vehicles. As they approach him, his excitement reaches such bounds that he causes the lamp to gyrate like a spinning-top, and the drivers of the various vehicles (kindly men, as mentioned above), tread on their brakes and draw up within a yard of each other, a perspiring hero in their midst.



"If I tied my horse to a tree —"

A Hymn of Hate (contd.).

But the Military Police are more sober and sedate. Their methods, too, are based on long experience in London streets. I am not summoned, now, for leaving a motorecyclo standing at the side of Shell hole Road; but if I should dream of tying my horse to a tree—the limb of the law is upon me!

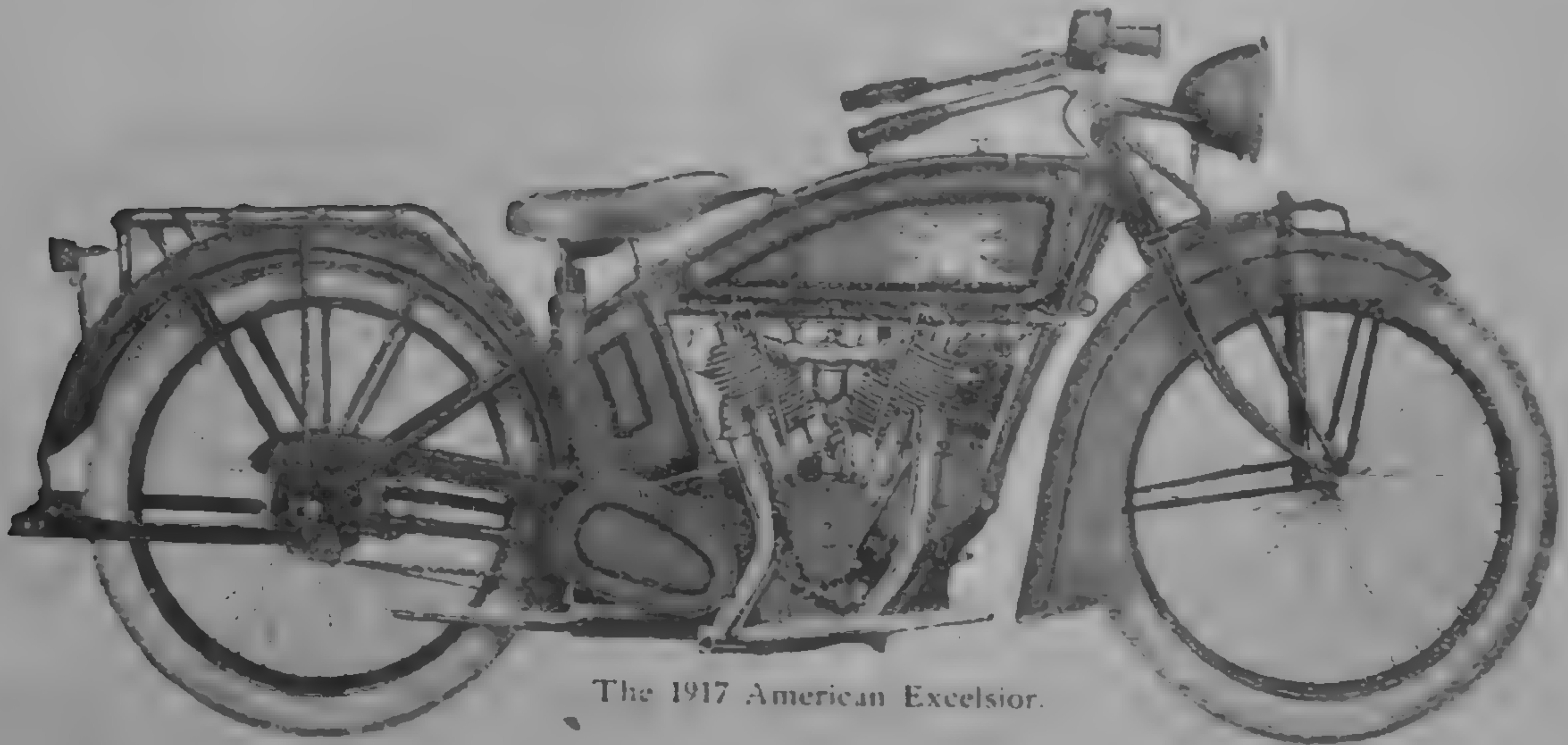
This very incident happened not so many months ago, with my groom as the chief offender. I received a letter from the Assistant Provost-Marshal, with a Crime Sheet enclosed—"for information and necessary disciplinary action." I wrote across it in blue pencil "Case dismissed," and added a note to the effect that as I had never heard of the order prohibiting horses being tied to trees in war time, and as my groom had not either, the matter became absurd. This was a particularly offensive note to send to an A.P.M. who is a mighty man of much red hat, and I was hoping for a row.

Lo! the reply was feeble in the extreme. It con-

sisted of a copy of the order "for information and guidance."

The memory of the road persecution which was at its zenith in the summer of '14 still rankles in my mind. The men who trapped us, who timed us with watches but poorly synchronized, are somewhere on the roads of France. Some of them, maybe, are doing their duty in the Army proper, but many, in khaki, are at their old tricks. There is the sly, smart, smooth sergeant—if I catch him in excess of his duties, his time has come. So I live and hope!

Once only have I written "paid." I was billeted in a room next to an estaminet, and the time was five to eight. They close at eight in France, and the place was filled with men enjoying a last drink. At four minutes to eight the estaminet door opened, and admitted a stalwart form. I had known him of old, on the Portsmouth Road. He took the men's names, and told them they were under arrest for being on the premises after hours. I emerged from my billet, informed him of the time—and arrested him instead!



The 1917 American Excelsior.

THE AMERICAN EXCELSIOR FOR 1917.

Few Alterations to Machine which, in Ordinary Times was Handled
in this Country by English Agents

IT will be remembered that, before the embargo was laid upon the import of American machines, Messrs. Harris and Sons, of 10-12, Great Chapel Street, London, W., were agents for the well-known American Excelsior, particulars of the new models of which are just available. There are no great alterations, however, in the 1917 programme of this machine, and this, indeed, seems to be a feature of new American machines generally. It certainly seems that in the States the manufacturers have settled down to a definite model—a full-size twin-cylinder machine with electric equipment as the highest note in their programme. Thus we have in the Excelsior a 1000 c.c. twin-cylinder, with a three-speed gearbox, plate clutch, and, of course, all-chain transmission, and a magneto-cum-dynamo combination ignition and lighting system. With regard to the electrically-equipped model, it will be seen that the front cylinder is completely—or almost completely—shielded from the air, which pays remarkable testimony to the excellence of the cylinder casting, for if this

were the usual type overheating troubles would be very apparent. Practically speaking, the alterations from this year's model consist of a removable bottom tank tube, which, when detached, permits the cylinders to be lifted from the crankcase without dropping the engine from the frame—a somewhat undesirable feature that was a drawback of last year's models—the mudguarding and carrier arrangements now so constructed as to permit the back wheel to be easily detached, whilst the provision of a permanent lug for sidecar attachment, interlined mudguards and a new military finish, which is becoming so popular in the States, consisting of enamelling the entire machine a greeny-grey finish, sum up the alterations.

A feature of the Excelsior programme is the two-stroke lightweight, which bears more than a close likeness to the Baby Triumph in many respects. The front fork, for instance, is an exact copy, whilst the cylinder casting and many other details bear a distinct resemblance.

C.A.V. Magnetos

BRITISH THROUGHOUT

Ignition troubles cannot exist

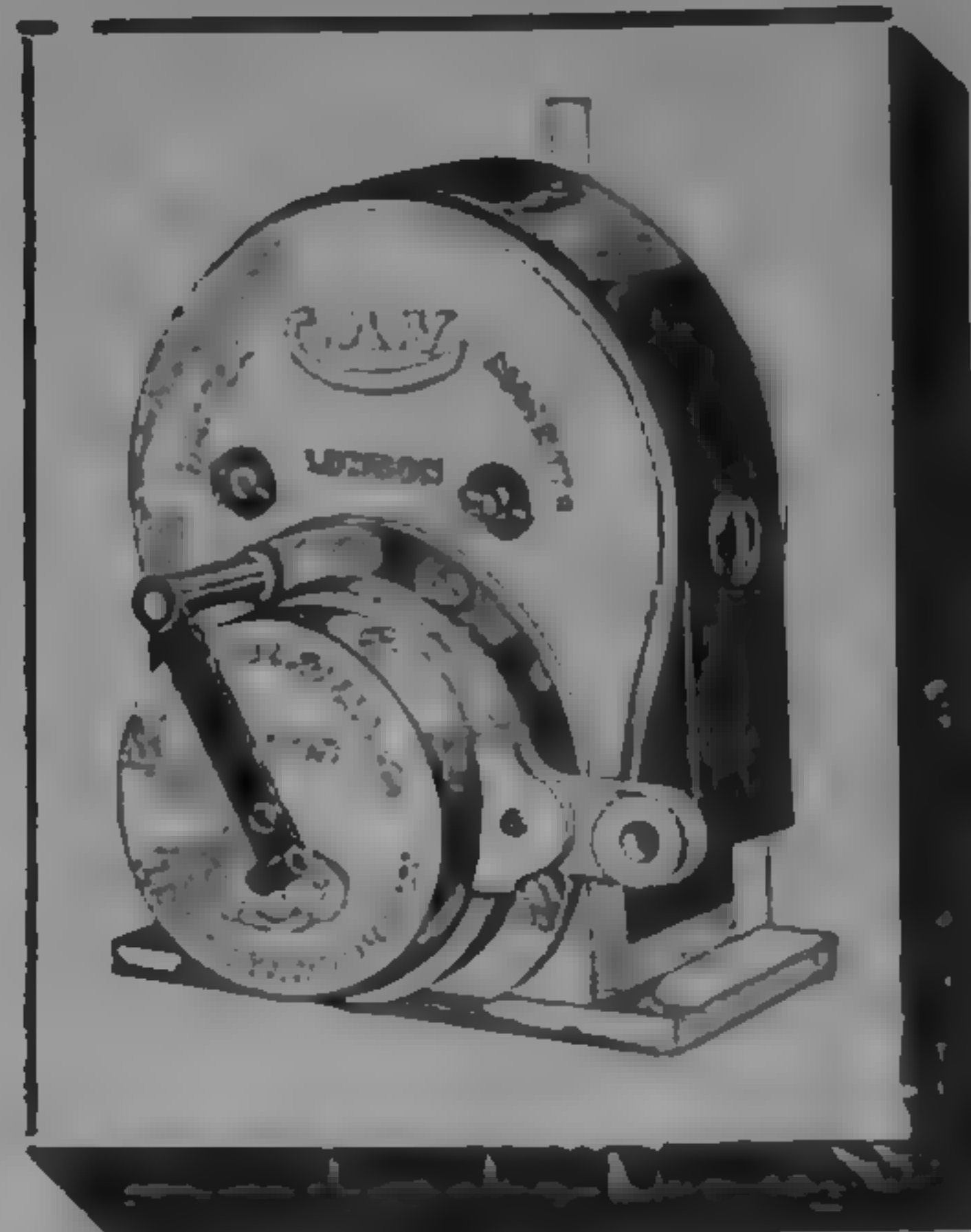
when the Motor bike or Cyclecar is fitted with a C.A.V. Magneto.—It's the little contrivance that sparks for sure even at walking pace—the Magneto which water, dust, heat, or cold cannot put out of action—the Magneto that relieves all ignition anxieties Write now for folder.

Members of



C.A. Vandervell & Co. Ltd.
Electrical Engineers, ACTON, LONDON.

Birmingham Stanhope Street
Manchester 12, Victoria Buildings.



As typically British as I am—

And that's exactly what we've tried to make the

JOHN BULL TYRES & BELT—

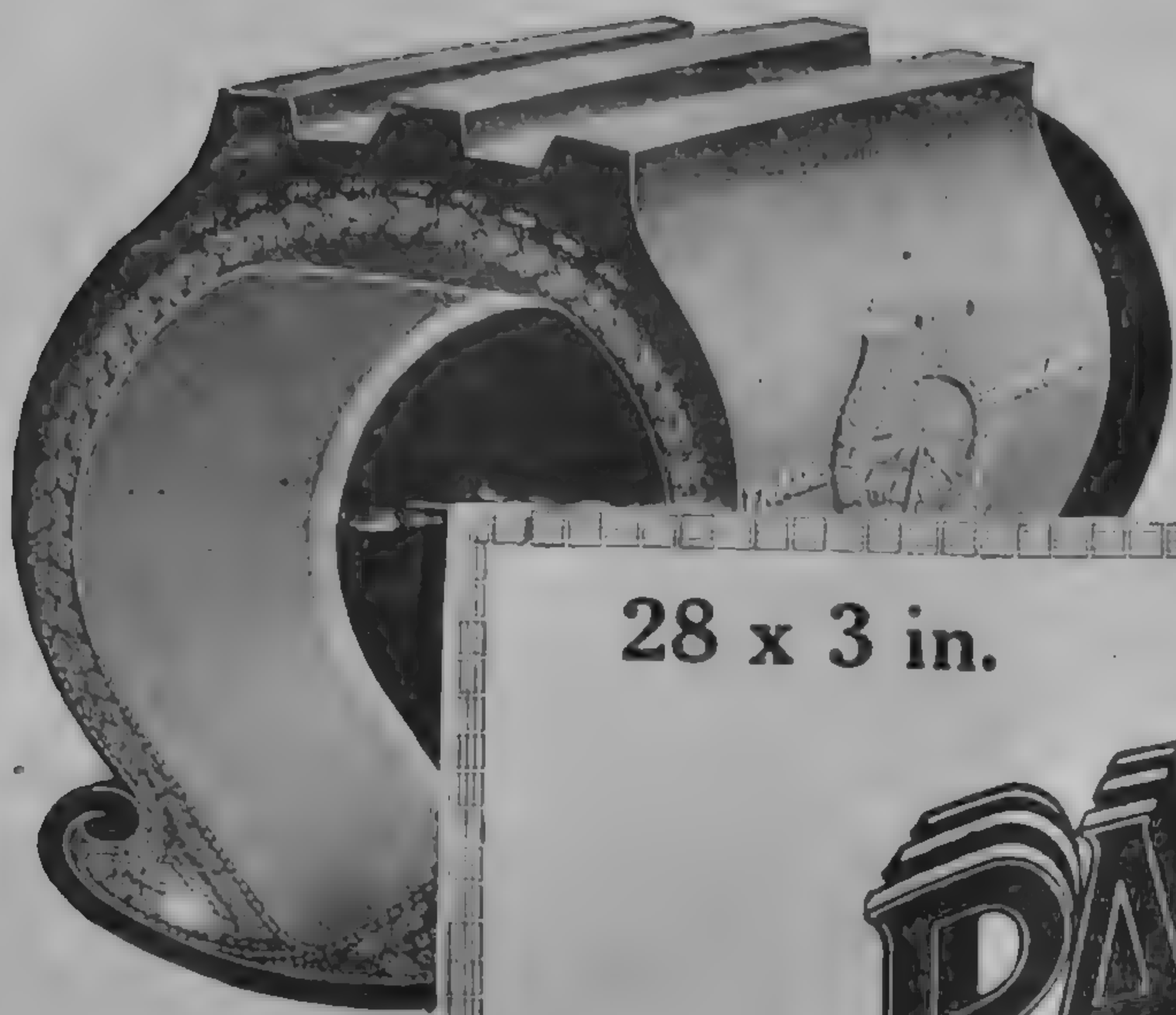
"typically British."—First of all entirely worthy of the British reputation for thoroughness and solidarity.—After that clean in design and appearance and ready to tackle the stiffest fight in their service on the road.

That they can do so is evidenced most strongly in their wonderful records—the 4,996 proved average back wheel mileage of the tyre—the remarkable wearing qualities of the belt.

John Bull never shirks a fight, neither do the Tyres and Belt which bear his name—they will stand up against any odds, and prove their merit best in the severest tests. Have you tested them? If not, do so now, first asking us for details of the latest prices—they're all in the Catalogue just issued.

LEICESTER RUBBER CO., LTD., LEICESTER.





*Reduced Prices
for Owners of . .
American Outfits!*

28 x 3 in. Three-Rib

PALMER
ORIGINATORS OF
THE THREE RIB TYRE
CORD TYRES

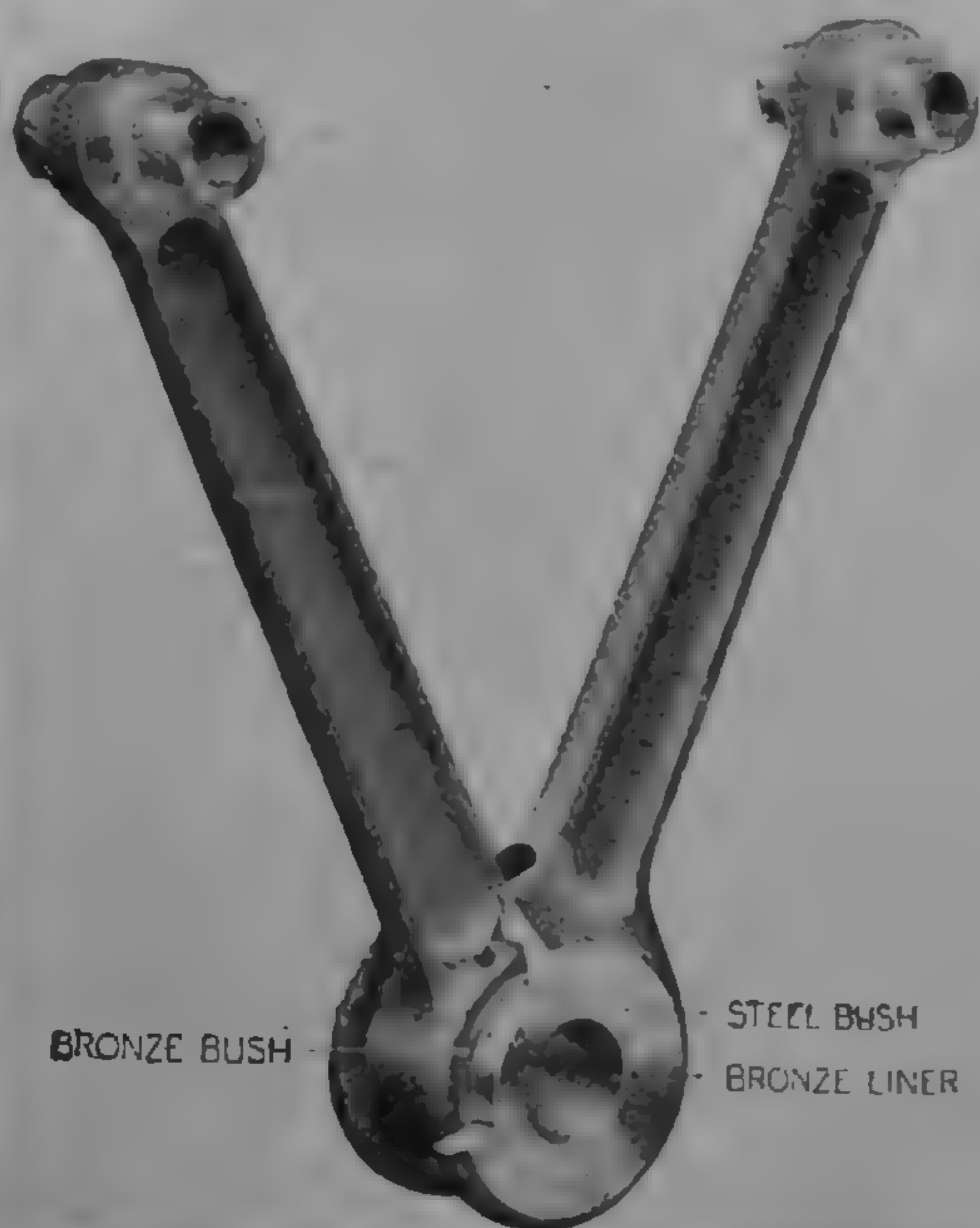
OLD PRICES:—
Covers, £2 15s. Tubes, 13/6.

Now £2-4s. and 10/6

We are now in a position to supply from stock.

THE PALMER TYRE Ltd., 119/123, Shaftesbury Avenue, London, W.C.
Cycle Tyre and Repair Depot: 103, St. John Street, Clerkenwell, E.C.

When examining the various parts of the J.A.P. Engine, their sturdy nature is at once evident, and gives the user confidence of reliability and durability. Every part is a sound engineering job, all flimsy work being studiously avoided.



FEATURES OF THE **JAP** Engines.

CONNECTING RODS

are steel stampings, and the special material from which they are manufactured allows of a light section with enormous strength. The forked and centre rod principle has always been adopted in J.A.P. Engines, as there is no binding strain due to connecting rods being out of centre with the piston.

THE BIG END

is one of the most important points. The difficulty which is experienced in designing the big end is to obtain sufficient bearing surface with the small amount of area available to withstand the power thrust of two powerful cylinders. It will be noticed, on referring to the illustration, that a steel bush passes from one side of the forked rod to the other. This is securely held by being shrunk into place. The centre rod is bushed with phosphor-bronze, and takes its bearing on the outside of the steel bush. The steel bush is lined with phosphor-bronze, and takes up the bearing surface on the crank pin; by this means the maximum bearing surface is obtained, perfect lubrication being ensured by the forcing of oil direct to the centre of the crank pin. Do not make any attempt to lighten connecting rods.

SPECIFY ALWAYS the famous J.A.P.

J. A. PRESTWICH & CO. Northumberland Park,
Tottenham, London, N.
"Grams - " Prestwich, Tottilane, London," 'Phone - 1613 Tottenham.

The Editor's Correspondence

The Editor is not responsible for, neither does he necessarily agree with, the views taken by correspondents. Both sides of any topic are given equal publicity. A pen-name or initials can be given for publication, but the writer's full name and address must always be sent. All communications should be written on one side of the paper only.

Auxiliary Tanks.

In reading your interesting paper (which I receive every week) I am struck by the number of designs, both by fellow readers and amongst the advertisements, for auxiliary tanks. To me they seem merely a useless, extravagance. While in England, just after the petrol restrictions, I ran on a variety of substitutes, ranging from 3s. a gallon brands to household paraffin, and never used a spare tank. To start using a mixture of three parts substitute and one part petrol, injection from the tank in the ordinary method was all that was required.

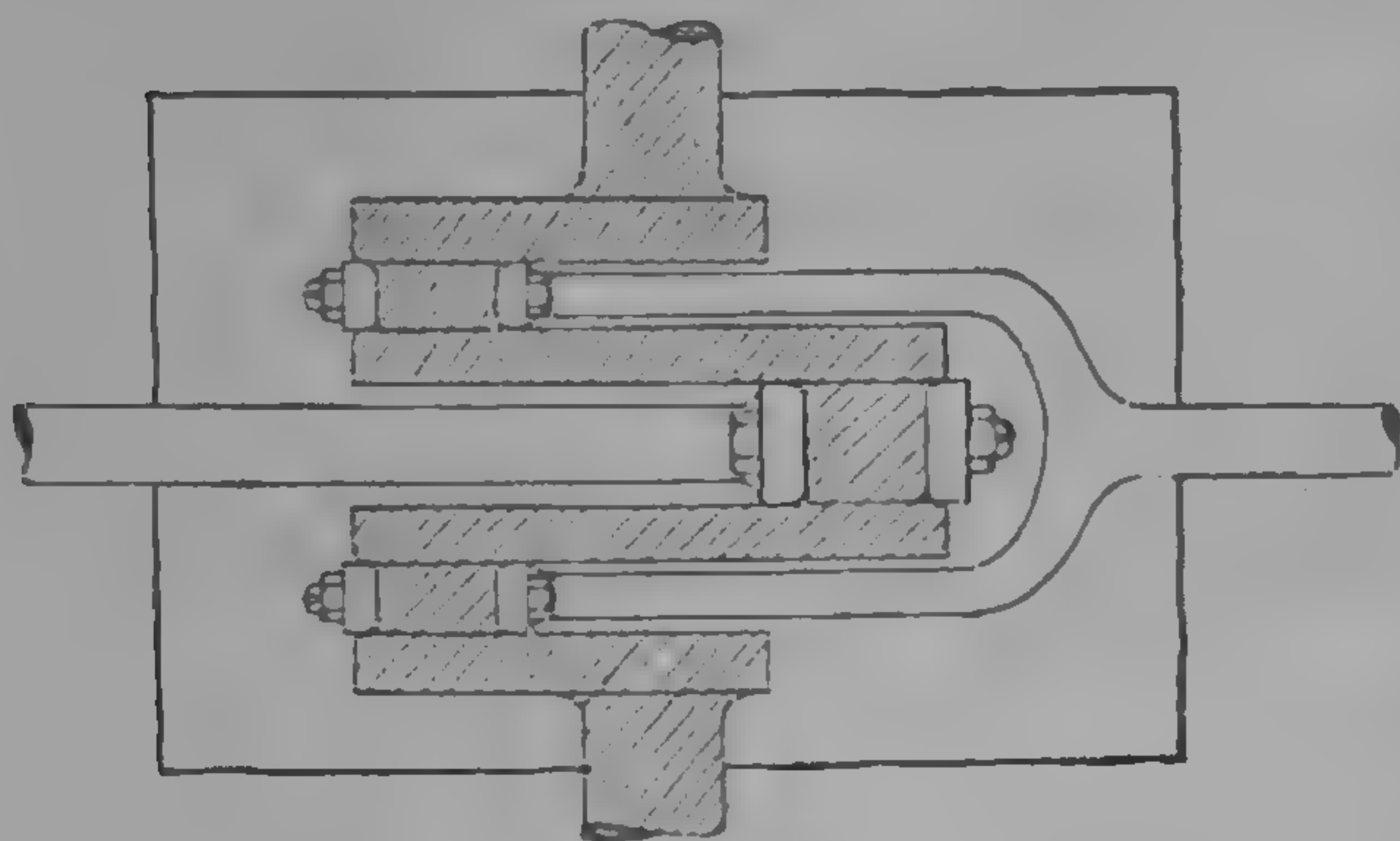
SUB., B.E.F.

More Accessibility.

Re article on accessibility by Francis B. Cooke, I quite agree that the modern combination is a very awkward affair to get at, and that there is ample scope for manufacturers in that direction to improve matters, but I cannot agree with him that it is impossible to converse with one's passenger. I find no difficulty in the matter at all, driving as I do a 4½ h.p. all chain drive B.S.A. combination (1916), which I must say is all that is to be desired.

EA417.

West Bromwich.



The suggested crankshaft design.

The Kiwi.

Referring to your informant's description of the "Kiwi" bird in "The Week's Gossip" of your issue of 12th inst., I would like to point out that this bird is a native of New Zealand and not Australia; in fact, there are only a few specimens out of New Zealand, as they are very difficult to keep in captivity; they generally sicken and die. I would not have bothered you with this letter, but everybody seems to think nowadays that New Zealand is a little island across the harbour from Sydney, N.S.W., and we seem to be in danger of losing our individuality.

W. S. G. PATON (Corporal), N.Z.F.A.

Savouring of Jules Verne.

In your excellent journal (which I take in weekly) it has been constantly affirmed that electric lighting is to be preferred on motorcycles, and having used acetylene generators I agree with this. It seems to me that a system which holds enticing possibilities is that of thermal electricity. A thermopile could be heated to produce the required electricity in several ways. It could be placed round the cylinder, in which position it would be more effective in cooling than the

copper wire coils so frequently used, or it could be heated by that hitherto untapped source of energy, the exhaust gases. The exhaust gases when cool occupy less space than the former volume of petrol air mixture, consequently by using the heat we could have the following advantages (1) electric lighting, starting and ignition; (2) quieter exhaust; (3) no oil or petrol fumes; (4) no generators, acetylene or electric; (5) coil ignition would allow two sparks per cylinder, etc., ad lib.

The simplest form of thermopile consists in wires or bars of dissimilar metals heated at the junction. Many pairs of these would be necessary, but manufactured by such a firm as C. A. Vandervell and Co they should give no trouble. If the electricity from the pile was used for ignition by means of a coil a small dry battery or accumulator would be required for starting up. The electric starter could, unfortunately, only be used when the engine was warm, but even that would be preferable to an engine not so fitted.

Sevenoaks.

E.T.W.

Preventing Mud Clogging.

I notice that in your interesting weekly many correspondents complain that mud collects between the mudguard and wheel and acts as a brake. Is the following idea of any practical value?

I obtained a small "breakback" type mouse trap, carefully removed the metal spring portion from the wooden base and soldered a flat piece of zinc across the moving portion. I then clipped the whole arrangement on the inside of the mudguard, one on the front wheel and one on the back. The spring was adjusted so as not to bear too heavily on the wheel. The thick mud was by this method completely removed from the tyre before it entered the mudguard.

10, Uppercourt Road, Epsom.

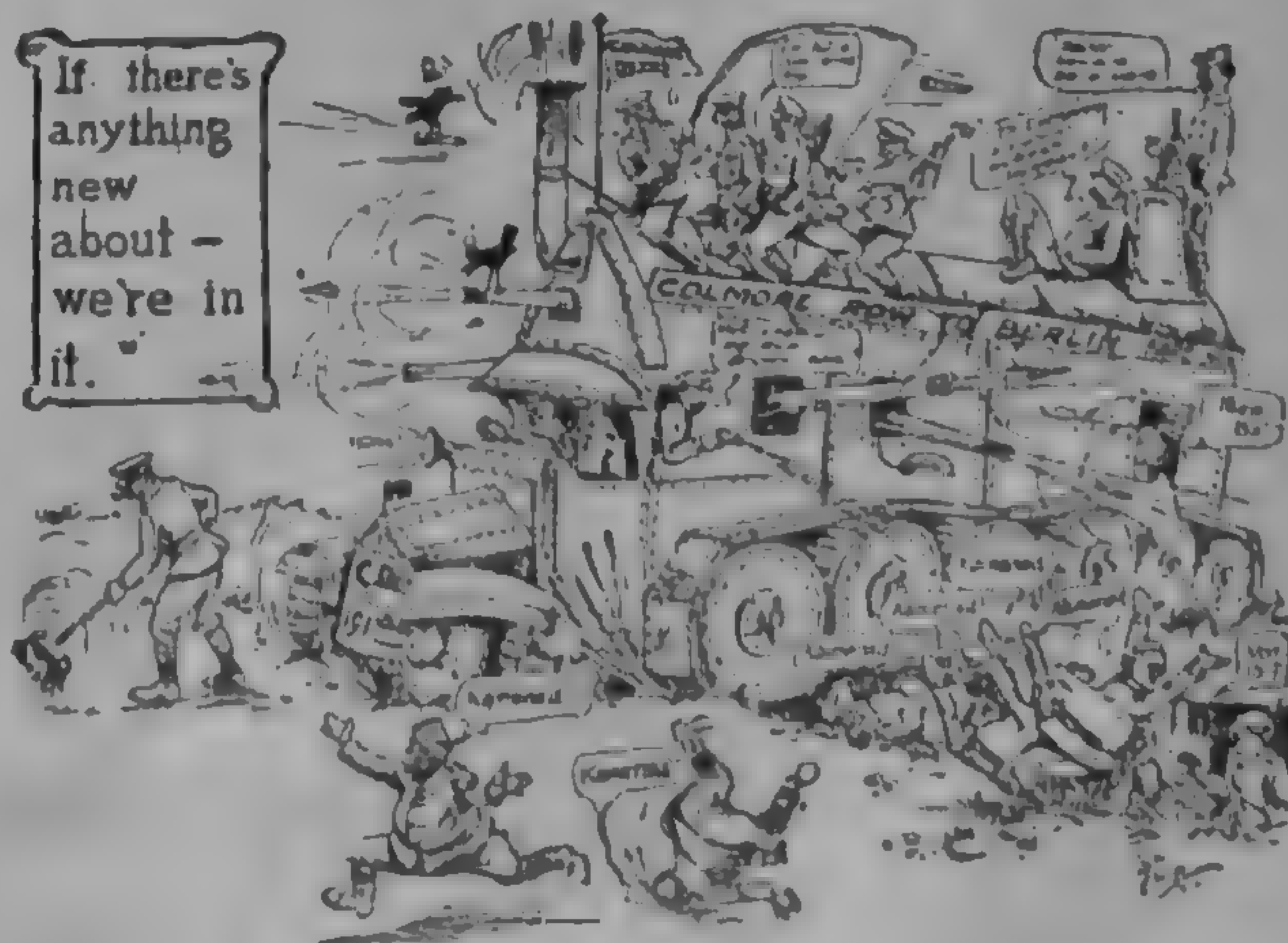
EDWARD J. TURNER.

Crankshaft Design.

I forward sketch of crankshaft and connecting rods. The use of which (correctly designed and balanced) would, in my opinion, be very suitable for large, flat twins, and bring both cylinders into line instead of the present offset cylinders.

43, Lorne Road, Barrow-in-Furness.

THOMAS RONEY.



The Colmore Depot, the famous motor-cycle agents of Colmore Row, Birmingham, have again issued a cheery Christmas card, of which the above is a reproduction.

Editor's Correspondence (cont.).

Coal Gas.

On page 81 of your issue of 28th November a reference is made to "Coal Gas for Petrol Engines." The idea has already been mooted in your columns, as you were—may I say?—far-sighted enough to print a letter from myself (in July, I think) under the heading of "Petrol Substitutes" advocating it.

F. READ, Asso. M. Inst. C. E.

Area of Jet Orifices.

Your correspondent Walter Turner seems to maintain that the ratio of the areas of two-jet orifices of 26 and 28 are not as $13^2 : 14^2$, or, if he likes, $26^2 : 28^2$, and that the ratio should be $(26^2 \times .7854) : (28^2 \times .7854)$. May I point out to him that his ratio is exactly the same as mine, only I have eliminated the common factor $3.1416 \div 4$ or $.7854$?

4, Linden Road, Bournville.

T. H. WINTERBOTTOM.

An Appeal to Pedestrians.

With the present-day lighting restrictions and these dark, foggy nights do you not think that there might be an appeal made to the public to walk on the pathway provided for this purpose? It is most dangerous to both the pedestrian and the motorist, especially the solo motorcycleist. One night recently, while riding on a foggy night and keeping well to the left to avoid other vehicles coming the other way I nearly ran into no fewer than five people in a few hundred yards.

Surely motoring at night is perilous enough without these sort of dangers. Wishing your excellent paper every success.

G. M. MARTINEAU.

Solihull.

Profit Snatching.

I am breaking the ice in writing to your paper after being a reader for six years. During that time I have read the "guid auld paper" in England, Egypt, Lemnos, and last but not least the Gallipoli Peninsula. My reason for writing is to state my experience of an out-and-out case of profit snatching like Mr. Davies's case. I required two piston rings for my $2\frac{1}{2}$ h.p. two-stroke ———, and was charged 5s. 6d. for the two, an increase of 1s. 6d. on each since war began. It is rather too much in my mind to have to pay even in war time, and expect I could have had some made locally for less. Once bitten twice shy.

Wishing the best of luck for your paper also best wishes of the coming season.

"DONE A BIT."

Knotty Ash.

Phraseology.

Anent your interesting article in this week's MOTOR CYCLING entitled "Motorcycling Phraseology," there is one point where I think your contributor has missed the mark. The word "gadgets" did not originate with the motor-cycling fraternity, but is a naval engineer's word, meaning in sea parlance just what it means in motor-cycling speech. In the old days when I was a Chaplain at Portsmouth, before the advent of the motorcycle, or, at least, when it was in its veriest infancy and could not talk, I frequently heard the word "gadgets" on the lips of engine-room artificers and engineers.

H. MUDIE DRAPER.

1, Holmesdale Gardens, Hastings.

Steam Motorcycles.

I was extremely interested in the description of the steam motorcycle, the invention of Mr. A. W. Field, in your last issue. In my opinion there is a distinct and very broad future for this type of two-wheeled machine. Indeed, we may expect far greater developments along these lines than from the two-stroke engine, which, speaking from an efficiency basis, has proved such a hopeless failure. The steam machine, particularly when used as a sidecar outfit, could be made quite neatly, and much of the present unsightliness obviated. If only large manufacturers would turn their attention to the steam machine instead of leaving the collar work to individual enterprise, we should soon have several types of machine on the road. At any rate, Mr. Field is to be congratulated on his efforts in this direction, and I hope that his future experiments will be even more successful.

A C. A.

Luton.

I was greatly interested in the new steam-driven machine which you described and illustrated in your issue of 19th December. Such a machine, in pre-war days, would have found capital and brains to take it up and make a marketable proposition of it; in the present circumstances, I suppose, it

will be allowed to fall into oblivion. It seems to me a thousand pities that progress should be arrested by such numbers of new and very interesting inventors being allowed to drop out of the public interest because they are not directly of military value. At a time like the present, when invention is more active than ever before, hundreds of really "good things" must be lost to posterity every day, simply because no one has time to take them up and perfect them. This should not be so: we need all our ingenuity to keep up our prestige in the scientific world where Germany is rapidly forging ahead. Could not some sort of national "safe deposit" be formed, in which such inventions could be kept fresh until such time as they can be utilized and developed?

Acton.

AMATEUR.

A. J. Stevens and Co. (1914) Ltd.

At the third ordinary annual general meeting of the above company, held last week, the following report was presented to the shareholders:—

Your directors beg to report that the available profits for the year ended 31st August, 1916 (including the balance brought forward from last year), less excess profits duty, after adequate depreciation, amount to £11,964 13s. 2d. Your directors recommend the following appropriations:—To pay a dividend of 2s. per share, less income-tax, £2425; to carry forward (subject to munition levy, excess profits duty, income-tax, and managing directors' commission, the amounts of which are not yet ascertainable), £9539 13s. 2d.—£11,964 13s. 2d. The company became a controlled establishment, under the Munitions of War Act, on 31st January, 1916. The retiring director is Mr. Harry Stevens, who is eligible, and offers himself for re-election. The auditor, Mr. Ernest Thursfield Brown, also retires, and is eligible for re-election.



The ancient porch of Brinklow Church, Warwickshire; it was close to here where Cromwell fought. Scarcely any trace of the church remains, and its vicinity is remarkable for the traces of an encampment to be seen on the Fosse Road, which passes close to the church.

INFORMATION & ADVICE.

Questions Answered through the Paper.

RULES:—Questions on technical matters, advice in selection of a new machine, etc., will be answered in the next issue after receipt of the inquiry so far as possible. Letters or postcards must be marked "I. and A." in top left-hand corner. Questions must be numbered, and a copy kept for reference. Machines upon which an opinion is sought should be numbered. Replies can also be sent by post if a stamped addressed envelope for that purpose is enclosed. Routes and legal queries are answered only by post. Catalogues of motorcycles or accessories which will materially assist in the choice of a machine or its equipment, can be sent if two penny stamps are enclosed.

C.J.F.R.—An applicant has to be 14 years of age before he can obtain a licence to drive a motorcycle.

E.D.E.—At the present time the only openings for motorcyclists in H.M. Forces are in the R.F.C. You should apply immediately in person to the Polytechnic, Regent Street, London, W. We cannot guarantee, however, that a vacancy will exist when you apply.

J.G.—(1) The noise you mention is due to play in the fork links, and we expect that the head of the cycle also wants tightening. With regard to the links, if you cannot take up the play by means of the nuts on the spring fork spindles, you will find that you can do this by interposing spring washers. (2) This is the wear we refer to. See 1.

R.O.J.—As we have not been able to obtain from the Grado Gear Co. a $3\frac{1}{2}$ h.p. machine fitted with one of their devices, we are unable to state as to whether it would be suitable for use in very hilly districts, or, in fact, in any district. With regard to the Philipson, however, we have had considerable experience of these gears, and found them entirely satisfactory.

Mac.—(1) The only mechanical device that you can have fitted to your two-stroke in order to facilitate easy starting is the Euk Easy Starter, manufactured by Alexander and Co., 113-115, Lothian Road, Edinburgh; also pay attention to the magneto, clean up the platinum points, while the points of the sparking plug should be as close together as possible. The carburettor should be overhauled and not too large a jet fitted. (2) No. (3) Dr. Low's book on the two-stroke engine published by us is by far the finest work on the subject. It will be forwarded to you upon receipt of 1s. 3d.

C.V.—We expect that an inlet valve guide or valve stem has worn badly, hence the misfiring. You can only check this by dismantling the valve and carefully noting whether air is leaking past. If so, it will be necessary to obtain a new valve, as we think, on the model you mention, the valve guides are integral with the cylinders. If you do not care to go to this expense, it is possible, by obtaining asbestos cloth, carefully to enclose the valve spring, thus preventing air leaking by. At the same time, see the carburettor induction pipe is very carefully attended to, and also the point where the inlet pipe is attached to the cylinders.

H.E.P.—(1) No difficulty at all should be experienced. If the clutch pedal is fully depressed and the engine throttled down, the gears should change easily. (2) Slipping sometimes occurs through a worn belt. Lay a straight-edge on the inner flanges when the belt is removed, and if the flange is concave it will be necessary to have it turned in a lathe until it is perfectly true. The fastener should not click or jerk as it passes over the belt. Cut a piece off each end of the belt and replace the fastener, taking care that the screws are perfectly central. (3) Why not obtain a speedometer, which, of course, is provided with a mileage recorder? This is the most satisfactory method. (4) We cannot give information with regard to second hand articles. (5) A or B. (6) it is not a failure, but, owing to manufacturing difficulties, the production has ceased for the time being. (7) This sounds as though the mixture is improperly vaporized, as apparently the paraffin, in a liquid state, was causing a short at the plug. We should strongly advise you to fit a gauze cone in the induction pipe. (8) Certainly; beaded-edge tyres. With your machine you would have much greater satisfaction if you were to go to the comparatively small expense of fitting flat base rims, and then fit a 650 mm. by 19 mm. volturette tyre.

E.A.—The concern is American, and we are unaware of the address. To date we have not published an article on cylinder boring and grinding.

H.M.—The situation is an interesting one, which we have never considered before. We have forwarded your letter on to our solicitors, and you will hear from them in due course.

A.H.D.—(1) With further reference to your queries, we do not think that you can obtain a better plug for ordinary use than the Lodge, although, of course, taking into consideration that the engine is quite a different one to the ordinary motorcycle two-stroke, a plug with thinner and wider points might be more advisable, although if the engine runs very hot this would not follow. We expect that the plugs go out of action through over-ignition, and you should cut down the oil supply. (2) See 1. (3) Here we have more or less a solution to 1. and, as we have stated, you should cut down the oil supply considerably. You might, as a matter of fact, run the engine on the petrol system, which consists of mixing half a pint of oil to 1 gallon petrol. If, of course, there are any signs of seizure or the engine gets unduly hot, the ratio should be increased.

A.F.—(1) We certainly should not advise you to continue using the piston as it is at present. It is bound to smash up completely very soon, and will more or less wreck the engine. (2) Yes.

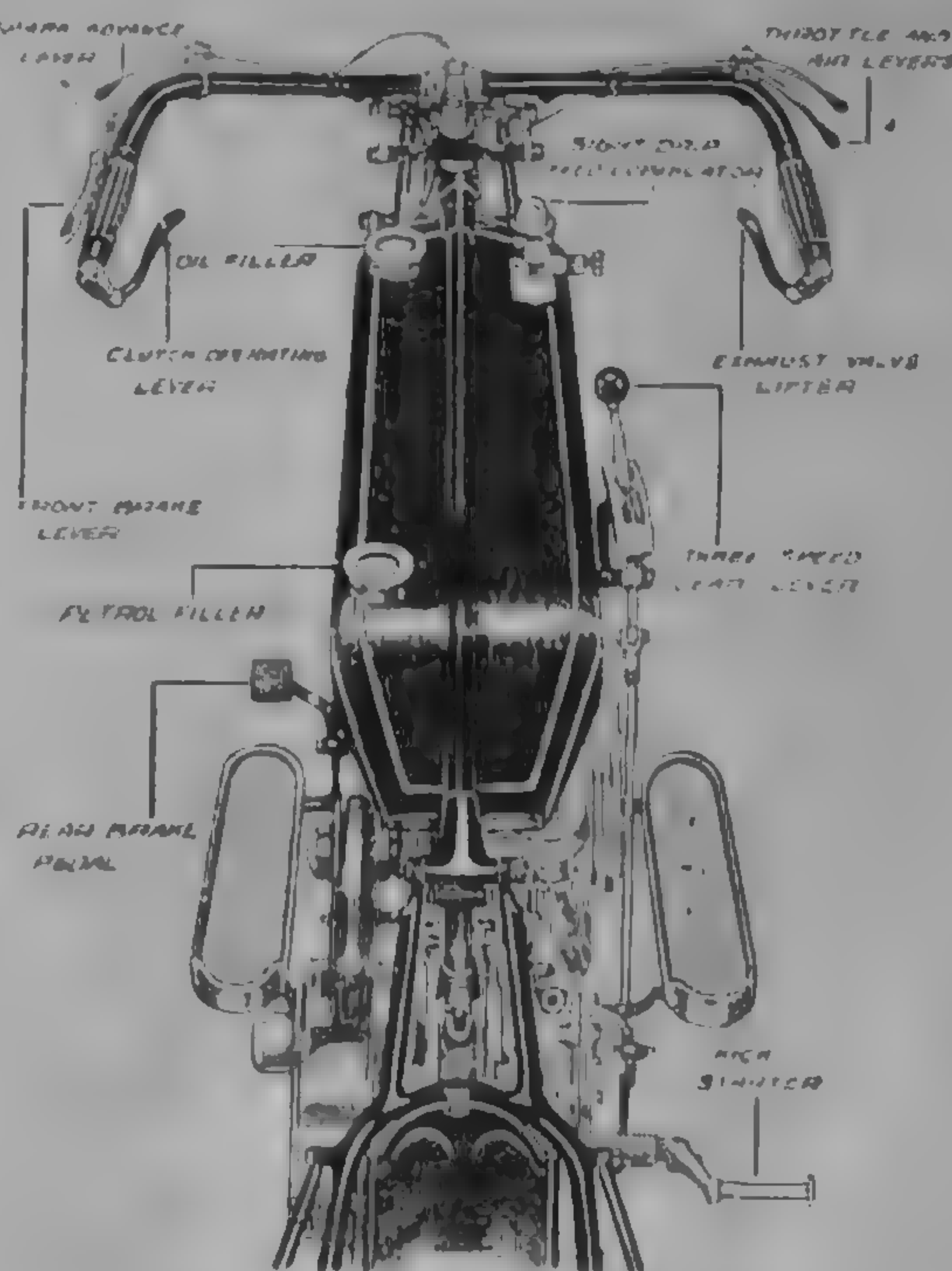
M.M.M.—There are so many machines that would be quite suitable that it is difficult to advise you. However, your choice at the present time is somewhat restricted, and we should advise you to obtain a Royal Enfield, Zenith, or Harley-Davidson.

H.A.R.—(1) It will not harm the magneto to fit the switch in question. The contact breaker strap carrying the cam should be drilled and a connection made by insulating wire from the armature screw to a switch on the handlebars. (2) We expect any repairer of repute would carry out the work. (3) We must plead ignorance of the design, but should imagine it would be possible.

J.F.—You must check the timing as follows:—The inlet valves should open when the piston is about to start on the induction stroke, and should close when it has travelled some little distance on the compression stroke. The exhaust valve should open before the piston reaches the bottom of the firing stroke and should close when the piston is at the top of the exhaust stroke. With regard to the ignition, when the platinum points have just broken the piston should be within 7-8 mm. from the top of the compression stroke.

J.S.O.—(1) We should advise either a Clincher, Dunlop or Avon combination. (2) You do not state what rims are fitted. At any rate, we expect that you can fit a 3-in. tyre. (3) As turned out by the makers. (4) The spring for easy starting should be fairly weak. This will not give you such good results when running fast. Strike a compromise. (5) There should be about 1 in. up and down play. (6) With regard to this, we should advise you to read an extremely interesting letter that appears in the issue of "The Light Car and Cyclecar" for 18th December. (7) Drilling the pistons and connecting rods is rather a ticklish job. We should not care to give advice without inspecting the piston. (8) Yes; you should apply to the L.C.C. for a duplicate. You do not have to pay the 5s. fee again. (9) Make an application to the Petrol Control Committee, 19, Berkeley Street, London, W. (10) No; you do not state what catalogues you require, so we return your stamps.

CONTROL OF BRITISH MOTORCYCLES. No. XVIII.



6 h.p. Rex J.A.P.

Information and Advice (contd.).

S.G.—You can obtain full particulars from the Acetylene Illuminating Co., Ltd., 268-270, South Lambeth Road, London, S.E.

E.B.A.E.—(1) Certain firms advertise who make a speciality of cutting down frames. (2) We are unaware at the present time.

O.W.—(1) You can obtain the garments required from the Service Co., High Holborn, W.C. (2) Get the lightest that you possibly can. It is immaterial what make.

W.J.W.—(1) The horse-power of the Auto-Wheel is rated at 1. (2) On favourable roads a top speed of 20 m.p.h. can be obtained. (3) Petrol consumption is approximately 80 m.p.g.

C.T.—The reason that the petrol consumption is so high is that the gear is ridiculously low. The top gear should be $1\frac{1}{2}$ to 1, so you should obtain a fresh sprocket from the makers. We are not in a position to give prices of second-hand machines; these vary so greatly in condition.

H.R.—The only experience we have had of a Grado-Multi pulley was on a $2\frac{1}{2}$ h.p. machine, when it worked with good results. We have not had an opportunity of testing the gear with a $2\frac{1}{2}$ h.p. motorcycle, and, therefore, cannot give any advice concerning its suitability for a machine of that power.

L.M.—We should say a $2\frac{1}{2}$ h.p. two stroke was decidedly not capable of taking two people about such districts as North Wales and Derbyshire. However, as the most powerful two-stroke of its class extant, your choice is limited to it. We expect that, with a three-speed gear, you would be able to climb some fairly steep hills.

J.S.—(1) We do not understand this query. You should, of course, fit 650 mm. by 65 mm. tyres, and you would get much better results. A 26 in. by $2\frac{1}{2}$ in. cover intended for the ordinary rims would not fit. (2) Apparently the cylinder requires rebaring and a new piston fitted. If the 1-16 in. play of the piston ring is vertical, you certainly require a larger ring.

T.W.N.—The Morgan vaporizer is a successful device. We expect that if you did not obtain absolutely successful results on pure paraffin, you would get good results on a petrol-paraffin mixture. At the present time you can only obtain two of the machines you mention—the Enfield and Zenith. Your choice is therefore limited.

A.E.P.—(1) You cannot fit a gearbox to your machine without structural alterations to the frame. (2) See 1. (3) Owing to the fact that the engine would run cooler, it is reasonable to suggest that slightly lowering the compression would give better hill-climbing capabilities. (4) There might be a slight reduction in speed. (5) It would be necessary to have the tank cut in order to fit a Best and Lloyd lubricator.

Hobart.—If your engine has only one valve it is indeed a peculiarity. What you mean, we expect, is that it has only one mechanical valve—the exhaust. The other is an automatic inlet contained in a dome immediately over the exhaust valve pocket. We expect that the trouble lies here. Detach and see if the inlet valve is in order. A spark should take place when the piston is within 7 mm. from the top of the compression stroke.

F.T.—With regard to your queries, there is, of course, no timing of the piston. Re timing the magneto. The ignition lever should be fully advanced, the magneto armature revolved until the platinum points are just about to break, and, with the average single-cylinder (you do not state your make of machine), the piston brought to within 7 mm. from the top of the compression stroke, when the magneto should be connected to the engine. The simplest way to time the valves is to bring the piston to the top of the exhaust stroke, when the inlet valve should be just opening, and when the piston has travelled 1 mm. on the induction stroke the exhaust valve should close.

R.H.—The statement that was made to you that a two-stroke could be pedalled off easily when a two-speed gear is fitted is correct 90 times out of 100. These engines, however, sometimes take a difficult starting fit, and we have often found ourselves considerably breathless after a pedalling attempt. We again reiterate that a clutch and kick-starter machine would be most suitable for you. If, however, you care to make a compromise, we fully expect you will get good results from a machine merely provided with a two-speed gear and no clutch or kick-starter. In looking through Messrs. Wauchop's list, for instance, of Christmas bargains, we see many machines that would be suitable for you.

S.A.L.—To the best of our knowledge, there is only one light sidecar available, and that is the two-stroke Excelsior. Catalogue forwarded.

H.N.M.—(1) Yes. (2) Yes. (3) Yes. (4) 120 m.p.g. (5) We think that it might be possible to fit the Albion two-speed counter-shaft gear. Stamps are returned, as no catalogues are available.

A.E.M.—The idea of using a V-type magneto is quite impracticable. It would be a waste of time trying to convert it. Your best plan would be to buy a second-hand two-cylinder, with equal firing periods.

B.T.—It appears that a good second-hand machine such as the $2\frac{1}{2}$ h.p. Douglas, the A.J.S., or the 3 h.p. Enfield, would be the most suitable for you. However, it is impossible for us to give advice on the purchase of second-hand machines; these vary so greatly in condition. We are, however, sending under separate cover catalogues of the three motorcycles mentioned.

J.H.—(1) No. (2) No. (3) No. We suspect the plug or some point in the combustion area becomes incandescent. At the same time, you should examine the engine for excessive side play by grasping the pulley and pulling it in and out from the crankcase. If there is more than 1-16 in. play, this should be rectified, whilst if the main bearings, especially if these are ball bearings, are worn this might easily cause the knocking. The jet is too large.

Busch.—The reason why you felt a shock when the plug was in the vice was because there was a leak connection for the current to pass from machine to plug through the vice and the floor through your boots to the handlebar and to magneto again. When, of course, the plug is in the engine the circuit is complete. Yes; the compression was sufficient to render the path of the current an easier one to pass between the points mentioned than the plug points.

T.C.—(1) No; the Petrol Control Committee have certainly not ceased to issue licences. As a matter of fact, they are issuing at the present time with a comparatively short delay. We should advise you to make another application to 19, Berkeley Street, London W., protesting against the delay. (2) See (1). (3) Castor oil is a good lubricant for cast-iron on cast-iron and steel on steel. With some grades of yellow metal, however, a certain amount of scoring takes place. It is, therefore, advisable to use castor oil as a dilutant of the ordinary lubricant. A 50 per cent. mixture is generally very satisfactory.

E.G.L.—(1) Query incomprehensible. (2) The gear is lubricated via the hollow main shaft of the engine. (3) If you refer to gear slip, we should advise you to have a fresh clutch spring fitted, and you might also find that the high gear clutch ring has become worn and polished, and so it will be necessary to renew it. (4) You should obtain at least 90 miles to the gallon. We expect that the engine and carburettor require a thorough overhaul. (5) Obtain an old jet, file it down 1-16 in., attach the float chamber and jet to the petrol pipe, and when the petrol is turned on, the fuel should rise so as to form a bubble on the top of the filed-down jet. You must, of course, hold the float chamber level.

I.M.—With regard to the queries, it is certainly somewhat difficult at the present time to advise on the purchase of a new machine, owing to restricted outputs. We think, on the whole, that it would be advisable for you to get into communication with the following makers. At the present time there are very few ladies' machines available, but in this respect we can recommend the two-stroke Excelsior, which is provided with a substantial drop top tube. On the other hand, you would find the standard model Allon, which is provided with a straight drop top tube, quite suitable with a skirt, not of the hobble variety, as the riding position is extremely low. Naturally, with a kick-starter and clutch, the somewhat undignified paddling-off process is avoided, although the former method is comparatively easy. In the case of the Allon, we do not think for a moment that it will be necessary to fix up special dress guards. Driving with an empty sidecar is undoubtedly a dangerous process, for when taking left-hand corners centrifugal force tends to raise the sidecar and renders the outfit rather unstable. Yet, however, if you are in the habit of carrying round samples of grain or other types of poultry feed, the inclusion of these in the sidecar would be of sufficient weight to keep the outfit stable. Naturally, if you could obtain a ladies' Douglas, we think for your particular purpose it would be difficult to find a more suitable machine, but these are now practically unobtainable. However, it might be worth your while getting into communication with Messrs. Douglas Bros., Kingswood, Bristol. You seem afraid that the frames on ladies' machines are not strong enough for average work. We can, however, disabuse your mind on this point.

R.O.L.—(1) Douglas. (2) The same. (3) 45 m.p.h.

A.L.G.—We can thoroughly recommend the "Big Four" Norton.

J.B.—We have only motorcycle catalogues, and therefore return your stamps.

R.C.W.—Apply to the Royal Flying Corps, Polytechnic, Regent Street, London, W.

L.R.B.—Yes, the booklet in question deals with the upkeep of Triumph motorcycles.

F.L.D.—Rodge catalogue forwarded. (1) No. (2) With the Multi gear between $3\frac{1}{2}$ and $7\frac{1}{2}$ to 1.

P.W.R.—We can hold out no chance of you obtaining a transfer—a most difficult process at the present time.

H.B.W.—(1) Yes. (2) The model indicated, yes. (3) Messrs. Chater Lea, Ltd., 74-84, Banner Street, Golden Lane, London, E.C.

H.H.—You are about the 10,000th reader we have told to apply to the Petrol Control Committee, 19, Berkeley Street, London, W.

E.S.—We can thoroughly recommend the 1 h.p. Bat for the most strenuous sidecar work. We are sending catalogue under separate cover.

H.H.B.—No; there is no necessity for you to take out a licence, although, to put the matter on a safe basis, we should advise you to dismantle both wheels.

I.P.B.—You will have no difficulty in obtaining a petrol licence if you make your application to the Petrol Control Committee, 19, Berkeley Street, London, W.

A.T.M.—We never give advice when readers ask us for information when they intend to build up a machine of their own. Such a project is invariably unsatisfactory.

G.A.S.L.—(1) The frame is strong enough, but it is necessary for you to fit a speed gear. (2) No. (3) No. (4) 80-85. (5) The lightest possible that you can obtain. (6) Yes.

B.E.—The letters T.T. represent Tourists' Trophy, like T.T. Triumph-Tourists' Trophy Triumph; T.T. handlebar—Tourists' Trophy handlebars. Catalogue forwarded.

H.A.L.B.—(1) No. (2) If purchased, yes. (3) Considering that there are Surrey gradients of 1 in 20, we fail to see how you can expect an Auto-Wheel to climb them. (4) See 3.

F.H.—You do not state what machine you require, and we are therefore returning your stamp. With reference to your query, the Sunbeam $2\frac{1}{2}$ h.p. machine is an absolutely first-class production.

J.D.—As you favour the Calthorpe, we will certainly do nothing to dissuade you from getting such an excellent little machine. The Enfield two-speed gear is all that can be desired, and, of course, incorporates a clutch action.

C.M.L.—The gears can be worked out by multiplying the top ratio by $\frac{33}{100}$ (equals 33 per cent.) and adding the result to the original figure. Thus, with a top ratio of 4 to 1, a 35 per cent. reduction would be arrived at as follows:— $4 \times \frac{33}{100} = 1\frac{1}{3}$. Bottom ratio = $4 + 1\frac{1}{3} = 5\frac{1}{3}$ etc.

L.S.—At the present time the small runabout propelled by an Auto-Wheel, or, rather, the American edition of the English Auto-Wheel, is not manufactured in this country. However, there would be no harm in your getting into communication with Messrs. Auto-Wheels, Ltd., 2, Russell Road, Kensington, W. They might conceivably build up a similar runabout to your order.

S.T.—(1) Apply to the makers and they will supply you with a suitable sprocket. (2) No. (3) Naturally, if you are attempting to start up on top gear with a passenger in the sidecar and one on the carrier, you will find the engine slow; low gear should be engaged. As a matter of fact, we should think you would find a big improvement if the cylinders were removed, new piston rings fitted, the engine and piston thoroughly cleaned, valves ground in, and new valve springs fitted. Compression can be tested by the kick-starter, and it should be practically impossible to kick it over compression with a fairly wide open throttle.

J.S.E.—Apparently the engine requires a thorough internal cleaning out. When piston and cylinder are freed from carbon, the valves ground in, and new valve springs fitted, and the trouble re-occurs, we should say that the plug points are becoming incandescent. Obtain a Lodge or a Sphinx, and note results. The knocking cannot be due to a loose bearing, or it would be more or less apparent the whole time. It is practically certain to be due to overheating, as it is apparent after the engine has been running under full load for some period. We presume that you manipulate the spark advance to a certain extent when hill-climbing.

Why

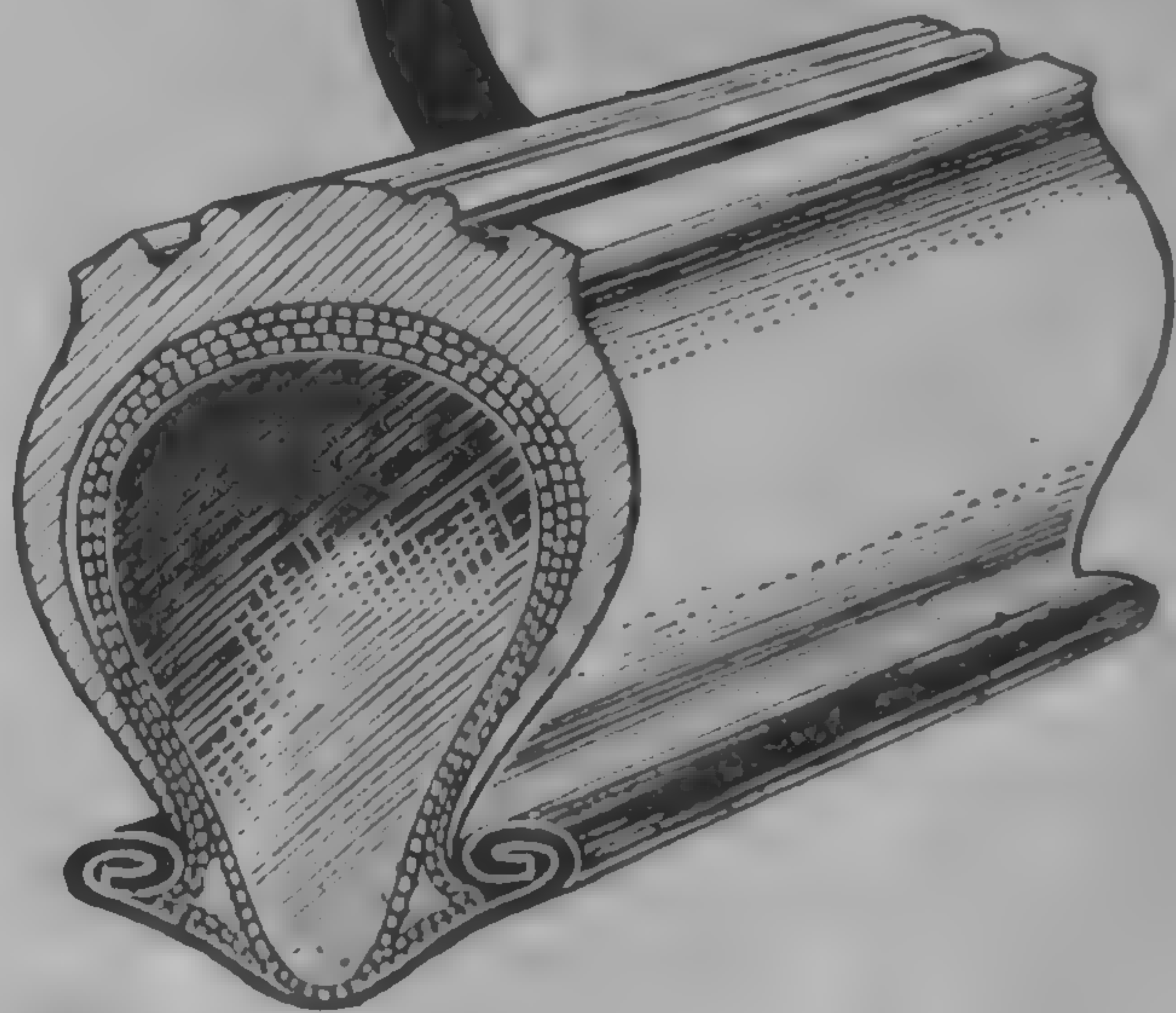


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MOTOR BICYCLES.

—A.J.S., 1915, 2½hp, 2-speed, clutch, kick-starter, beautiful condition, accessories, best cash offer accepted. Malbrooke, Wolsley Rd., E. Molesey, Surrey. 372-0919

—A.J.S. 1912 6hp twin combination, £40. Take and Bell, Ltd., Motor Dept., Carlton Engineering Works, High Rd., Tottenham, N. 372-924

—A.J.S., 1913, 2½hp, 2 speeds, chain driven, £21. Percy and Co., 337 Euston Rd., London. 372-914

—ALLDAYS ALLON, 1916, 2 speeds, clutch model, with 11-guinea C.B. lightweight sidecar to match, speedometer, lamps, tools, etc., £45; would separate. Croney, 43 Dorchester St., New North Rd., N. 372-854

—ALLDAYS ALLON, 1916, 2-speed, good order, 29 guineas. Troward, 78 High St., Hampstead. 372-890

—ALLDAYS ALLONS, 9 models actually in stock, deferred terms, exchanges also 1915 2-speed h-clutch model, really fine order, £36 10s.; and Matchless 1914 at £12 12s. Lamb's, 151 High St., Walthamstow; and 50 High Rd., Wood Green. 372-873

—ALLDAYS-ALLON, brand new, shop-soiled, 2-speed, £40. Jones, Garage, Brbadway, Muswell Hill. 372-926

—ALLDAYS MATCHLESS, 2-stroke, will take £20 for quick sale. Pulling, Half Moon Garage, London Rd., Croydon. 'Phone, 1619. 372-868

—ALLONS, full range of 1917 models for immediate delivery. Colmore Depot, 31 Colmore Row, Birmingham. 372-522

—ALLONS, all models, positively in stock, £37 18s. to £47 5s.; exchanges, easy payments. Lamb's, 151 High St., Walthamstow; and 50 High Rd., Wood Green. 372-867

—ALION, 1916, 2½, 2-stroke, 2 speeds, speedometer, horn, etc., only done 50 miles, bargain. The Barnes Motor Garage, opposite Red Lion, Barnes, S.W. 'Phone, 1743 Hammersmith 372-935

—ARIELS. I can give immediate delivery of 5-6 1917 Ariels, combination. I can also deliver immediately 1917 3½hp solo or combination. Jones, Garage, Broadway, Muswell Hill. 372-927

—AUTO-WHEEL de luxe, 1916, practically new, £10 10s., with lady's bicycle, £16, or offer, thoroughly recommended. Brown, Argo House, Whitechurch, Hants. 372-0875

—BAT, 4hp combination, 2-speed countershaft gear, perfect order, bargain, £20. Box No. 100, c/o "Motor Cycling." 372-858

—BAT-J.A.P., late 7hp twin, Bosch, fine sidecar machine, £19 18s Wandsworth Motor Exchange, Ebnor St., Wandsworth (Town Station). 372-873

—BRADBURY, 1913, T.T., 4hp, good running order, £18. Sheldrake, Rose Cottage, Dedham, Colchester. 372-887

—BRADBURY, 1912, 3½hp, N.S.U. 2-speeds, in real good order, £17; another £14. Percy and Co., 337 Euston Rd., London. 372-913

—B.S.A., 1916, 4½hp, chain drive, 3-speed countershaft gear, Phoenix coachbuilt sidecar, accessories, mileage under 2000 miles, £63, or near offer. 136 Ancona Rd., Plumstead, S.E. 372-893

—B.S.A. 1914 combination, countershaft 3-speed, wonderful engine, can tackle any hill, lamps, horn, spares, £45. 34 Laisteridge Lane, Bradford. 372-860

—B.S.A., latest new models, can be delivered from stock; chain-drive model H, 3-speed countershaft gear, £66; chain-cum belt model K, £64; Montgomery sidecars in stock, to fit, from 10 guineas; your present machine can be taken as part payment. Below.

—B.S.A. 1916 3-speed countershaft model K, with coachbuilt sidecar, £63. Elce and Co., B.S.A. Agents, 15-16 Bishopsgate Avenue, Camomile St., E.C. 372-857

—B.S.A., 1917, 4½hp, Model K, £64; delivery from stock. D. J. Shepherd and Co., Enfield Highway, N. 372-899

—B.S.A.s, 1917 model H, all-chain, £66, and 1917 model K, £64, not "coming in," but actually in stock; deferred payments arranged; exchanges; good prices allowed for second-hand up-to-date machines. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. Telephones, Walthamstow 169 and Hornsey 1556. 372-865

—B.S.A. 1916 model K, 4½hp, 3-speed, kick-start, original tyres, Palmer oversize tyre on rear, coach sidecar and screen, £68 10s. Lamb's, 151 High St., Walthamstow; also 50 High Rd., Wood Green. 372-870

—B.S.A., 1916, 4hp, 3 speeds, kick-starter, almost new, fitted cane sidecar, bargain, £60. The Barnes Motor Garage, opposite Red Lion, Barnes, S.W. 'Phone, 1743 Hammersmith. 372-937

—B.S.A., 1914, 4 hp, 3 speeds, kick-starter, fitted sporting sidecar, excellent order, many spares, bargain, £50 or offer. The Barnes Motor Garage, opposite Red Lion, Barnes, S.W. 'Phone, 1743, Hammersmith. 372-936

—B.S.A.s, 1917, actually in stock, immediate delivery for cash or deferred payments; also 1913 2-speed B.S.A., in perfect order and condition, belt drive, £30; another, 1913, chain drive; all machines fitted with all accessories. Jones, Garage, Broadway, Muswell Hill. 372-928

—CALTHORPE 2-stroke 2-speed, practically new, very little used, fully equipped, owner serving, best offer secures. Mrs. E., Rinkside, Penrhyn Rd., Kingston S.W. 372-0915

—CALTHORPE, 1914, 3½hp, 3 speeds, combination, new coach-built sidecar, £34.

—CALTHORPE, 1911, 2hp, 2 speeds, £13.

—CALTHORPE, 1915, 2½hp J.A.P., Enfield 2-speeds, £22. Percy and Co., 337 Euston Rd., London. 372-912

—CALTHORPE-J.A.P., 1915, 2½hp, Enfield 2-speed gear, free engine, just been re-enamelled, £29. William Betts, Ltd., 96 Upper Richmond Rd., Putney. 'Phone, 1766 Putney. 372-856

—CALTHORPE JUNIOR, 1914, 2hp, 2-speed, lamp, horn, perfect order, unused since 1915, £15. D. J. Shepherd and Co., Enfield Highway. 372-903

—CAMPION-J.A.P., 4hp, 2-speed, clutch, free engine, tyres and tubes good, £25 or offer. Sutton, Little Clacton, Essex. 372-886

—CHATER-J.A.P., 4hp, 1912, 2 speeds, free engine, splendid order and condition, with accessories, £17; coachbuilt sidecar, £4 10s. 45 Charles St., Exmouth St., Stepney. 372-879

—CHATER LEA, 5hp twin J.A.P., combination, a real bargain, £16. Percy and Co., 337 Euston Rd., London. 372-911

—CLYNO, 1915, 6hp, with No. 6 sidecar, with screen, spare wheel, Palmer cord steel-studded tyre on back wheel, light car tyres all wheels, special military finish, as new, with Lucas lamp set, horn and Jones speedometer, £85, without accessories £80. Can be seen in London at any time. A magnificent outfit, especially suitable for officer. Box No. 8405, c/o "Motor Cycling." 372-452

—CLYNO 6hp combinations, 1917 models, War Office standard throughout, with detachable wheels and 7-point attachment sidecar, nothing better on the market, immediate delivery, 100 guineas, including spare wheel. Colmore Depot, 31 Colmore Row, Birmingham. 372-521

—CLYNO, 1914, 2½hp, 2-speed, condition like new, £27. Wilkin and Co., Hunter's Bar, Sheffield. 372-903

—CLYNO 1912 combination, 5-6, 2-speed, clutch, fast, clearance bargain, 23 guineas. Troward, 111 High St., Hampstead. 372-895

—DAYTON, 1911, 2hp, magneto, only done 300 bargain, £16 16s. 1 Ebner St., Wandsworth. 372-874

—DOUGLAS. Immediate delivery all 3½hp models. Moffat, Douglas agent, Yeovil. Tel., 50. 404-070

—DOUGLAS models for sale: 1 1911 model, £10; 1 1911 model, £14; 1 1913 model, 2-speed, kick starter, free engine, £30; 1 1913 model, 2-speed, £30; 1 1915 model, T.T., 2-speed, £33; 1 lady's model, £38. T. Baker and Sons, 35 Friar St., Reading. 372-771

WAUCHOPE'S

NEW YEAR BARGAINS.

NEW MACHINES.		
No.		£ s.
10080	2½ h.p. 1916 2-sp. 2-stroke Allon	42 0
10175	2½ h.p. 1916 2-st. Galthorpe	£28 17 6
10227	2½ h.p. 1916 single-sp. Galthorpe-Jap	£32 0 6
10367	2½ h.p. 1916 single-speed Lewis	32 0
10488	2½ h.p. 1916 2-sp. 2-str. Galthorpe	32 11
10497	2½ h.p. 1916 2-sp. Galthorpe-Jap	37 16
10505	2½ h.p. 1916 New Imperial Jap	38 0
10578	2½ h.p. 1916 2-sp. Galthorpe-Jap	37 16
10579	2½ h.p. 1916 2-sp. Galthorpe Jap	37 16
10637	4½ h.p. 1916 2-speed Bat	63 5
10652	4½ h.p. 1916 2-sp. Galthorpe com.	70 7
10672	3 h.p. 1916 Royal Enfield	57 15
10677	2½ h.p. 1916 sin. sp. Popular Lewis	32 0
10692	6 h.p. 1916 2-sp. Enfield comb.	59 15
10699	2½ h.p. 1916 2-sp. New Imperial	38 0
10741	4½ h.p. 1917 3-sp. model H, B.S.A.	66 0
10762	3½ h.p. 1916 3-sp. Ariel	65 10
10778	6 h.p. 1916 2-speed Enfield com.	99 15
10783	2½ h.p. 1917 2-sp. New Imperial	40 19
10790	2½ h.p. 1917 2-sp. Allon	42 0
10791	2½ h.p. 1917 2-sp. Allon	42 0
10792	2½ h.p. 1917 2-sp. Allon	42 0
10803	2½ h.p. 1917 2-sp. kick start New Imperial	48 6
10818	2½ h.p. 1917 single-speed Lewis	32 0
10819	2½ h.p. 1917 single-speed Lewis	32 0
10820	2½ h.p. 1917 single-speed Lewis	32 0
10821	2½ h.p. 1917 model E Lewis 2-sp.	47 10
10822	2½ h.p. 1917 2-sp. model E Lewis	47 10
10817	2½ h.p. 1917 2-sp. New Imperial	40 19
10818	10 h.p. 1917 2-speed Morgan	132 12
10842	6 h.p. 1915 3-sp. A.J.S. combination	96 gns.
10844	4½ h.p. 1917 model K 3-sp. B.S.A.	64 0

NEW 1915 MACHINES.		
No.		£ s.
9561	2½ h.p. 2-sp. Wolf, 2-stroke	£26 8 0
9902	2½ h.p. 2-speed Wolf-Jap	33 10 0
9947	2½ h.p. 2-stroke Wolf	24 18 6

LIST OF SIDECARS IN STOCK.		
No.		£ s.
4647	1912 Montgomery castor-wheel sidecar, No. 5	4 10
6163	1912 Condola sidecar	7 10
7751	Williamson cab	£20 0 0
7941	Coach-built sidecar	2 0 0
8923	Bradbury wicker tradesman's carrier, new	12 0 0
9607	Canoet coach blt. sidecar	11 0 6
9855	Canoet sidecar	14 0 6
9955	Canoet C4, with apron	14 8 0
10284	Model B3, Canoet ch-bl.	14 8 9
10525	1916 Empire sidecar	13 0 0
10526	1916 Canoet sidecar	9 9 0
10532	1916 Canoet sidecar	13 1 0
10535	Godiva sidecar	8 0 0
10555	Canoet coach-built sidecar	13 0 0
10558	Canoet sidecar	14 17 0
10560	Minor Canoet sidecar	9 19 6
10576	Rudge sidecar, new	14 18 0
10589	Canoet Minor sidecar	9 19 0
10625	Canoet sidecar, new, Minor	9 19 6
10636	Canoet sidecar, new	14 17 6
10665	Coach-built sidecar, new	13 15 0
10666	Coach-built sidecar, new	14 10 0
10667	Coach-built sidecar, new	14 10 0
10690	Coach-built Canoet sidecars with fittings suitable for	
10691	B.S.A. machines	14 17 6
10788	ditto ditto	15 8 6
10720	Wicker sidecar	3 10 0
10812	Wicker sidecar	3 10 0
10832	Canoet side car, new	15 8 6

Second-hand Machines in Stock.		
No.		£ s.
3748	1½ h.p. 1909 Motosacoche	12 10
6421	3½ h.p. 1908 Minerva	15 0
7521	5-6 h.p. 1911 4-cyl. F.N.	20 0
7551	3½ h.p. 1905 Rex	12 10
7708	3½ h.p. 1908 N.S.U.	16 0
7992	3½ h.p. 2-speed Fafnir and coach-built sidecar	22 10
8320	3½ h.p. 1911 Ariel, variable gear	20 0
8561	3½ h.p. Vindex and sidecar	17 10
8718	3½ h.p. 2-sp. Fafnir and sidecar	22 10
8804	7 h.p. 1914 Indian with electric starter	80 0
8832	1½ h.p. 1909 Motosacoche	0 0

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Second-hand Machines in Stock. - Contd.		
No.		£ s.
9076	5 h.p. 1907 f.c. Roc	20 0
9429	7 h.p. 1913 Premier and sidecar	57 10
9542	2½ h.p. 1915 2-sp. Sun Vitesse	32 10
9594	5-6 h.p. 2-speed N.S.U.	30 0
9633	2½ h.p. 1912 Premier, v'ble gear	18 10
9656	2½ h.p. twin N.S.U.	17 10
9767	5 h.p. 1908 2-sp. Rex and s.c.	27 10
9772	3½ h.p. 1912 water-cooled 3-sp. Humber	37 10
9778	3½ h.p. 1914 3-sp. New Imperial and sidecar	37 10
9823	2½ h.p. 1912 twin Enfield	27 10
9839	3½ h.p. 1907 Triumph and s.c.	22 10
9844	5-6 h.p. N.S.U.	18 10
9847	4½ h.p. 1915 3-sp. Quadrant	42 10
9867	2½ h.p. 1911 2-speed Enfield	26 0
9958	1½ h.p. 1909 2-sp. Rex and s.c.	28 10
9995	4-5 h.p. 1913 3-sp. Hazlewood and sidecar	37 10
10021	3½ h.p. 1912 Swift	22 0
10037	4 h.p. 1914 3-speed Wolf	35 0
10070	6 h.p. 1914 2-sp. Enfield comb.	65 0
10109	3½ h.p. 1909 f.c. Triumph	25 0
10127	1½ h.p. 1912 Zenith and sidecar	35 0
10142	3½ h.p. 1913 3-speed Singer	32 10
10205	3½ h.p. 2-speed N.S.U.	20 0
10271	2½ h.p. 1915 2-speed Lewis	32 10
10323	2½ h.p. 1911 2-speed Douglas	25 0
10333	3½ h.p. 1908 Triumph	22 10
10342	1½ h.p. 1914 Auto-Wheel	18 10
10390	2½ h.p. 1915 2-speed Wolf-Jap	30 0
10402	4½ h.p. 1915 Grandex	37 10
10419	2½ h.p. 1915 Galthorpe-Jap	33 10
10427	3½ h.p. 1912 3-speed Rover and sidecar	32 10
10430	2 h.p. 1914 2-speed Galthorpe Junior	17 10
10432	2 h.p. 1914 2-speed Galthorpe Junior	18 10
10448	4½ h.p. 1914 3-sp. B.S.A. & s.c.	57 10
10458	2½ h.p. 1915 2-speed Olyno	25 0
10462	5-6 h.p. 1913 2-speed N.S.U. and sidecar	42 0
10474	2½ h.p. Twin Royal Enfield	23 10
10485	4 h.p. single-speed Bradbury	23 10
10521	1½ h.p. single sp. Motosacoche	6 10
10529	2½ h.p. 1913 2-sp. Douglas	41 10
10533	4½ h.p. 1912 3-speed Quadrant	27 10
10594	2½ h.p. 1915 twin Indian	47 10
10540	4½ h.p. 1911 3-sp. James and s'car	50 0
10507	2½ h.p. 1915 2-speed 2-stroke Galthorpe	25 0

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Second-hand Machines in Stock—Contd.

No.		£ s.
10573	2½ h.p. 1915 2-speed Galthorpe	31 10
10587	4½ h.p. 1914 Quadrant and sidecar	42 0
10589	3½ h.p. 1913 Rudge-Mull and s.c.	15 0
10610	2½ h.p. 1914 3-sp. New Hudson & s.c.	45 0
10614	3½ h.p. 1911 single-speed Humber	25 0
10616	8½ h.p. 2-speed Regal-Precision	26 0
10629	3½ h.p. 1914 Rover and sidecar	50 0
10936	1 h.p. 1914 2-sp. Singer and s.c.	45 0
10638	5 h.p. 1912 single speed Indian	20 0
10643	3½ h.p. 1918 Rudge Mulli	40 0
10649	3½ h.p. 1913 single speed B.S.A.	25 0
10660	3½ h.p. 1914 Zenith-Gradua	45 0
10661	6 h.p. 1913 Enfield and sidecar	45 0
10663	7 h.p. 1918 2-speed Indian	35 0
10682	3½ h.p. 1914 3-sp. Bradbury	47 18
10686	2½ h.p. 1912 2-sp. Singer	20 0
10687	1½ h.p. single speed J.E.S.	10 0
10688	2½ h.p. 1911 2-sp. Douglas	22 10
10699	3 h.p. 1913 3-sp. Hobart and s'car	35 0
10701	2½ h.p. 1911 single speed Douglas	22 10
10705	12-16 h.p. Vauxhall car	125 0
10713	4-5 h.p. 1914 Zenith Gradua & s.c.	37 10
10717	4½ h.p. 3-sp. Precision	22 10
10721	3½ h.p. 1912 3-sp. Triumph & s.c.	42 10
10727	4½ h.p. 1915 3-sp. B.S.A.	—
10738	3½ h.p. 1912 F.E. Triumph	25 0
10739	2½ h.p. 1915 2-sp. New Imperial	37 0
10740	2½ h.p. 1916 2-sp. New Imperial	35 0
10744	2½ h.p. 2-sp. Allon	27 10
10745	2½ h.p. 1914 single-sp. Sun V.T.S.	75 0
10746	2½ h.p. 1914 s-sp. Sun-Villiers	17 10
10748	2 h.p. single-sp. Hobart	20 0
10750	4½ h.p. 1916 3-sp. B.S.A. & s.c.	65 0
10751	1½ h.p. 1915 model de luxe Morgan runabout	94 10
10753	5-6 h.p. F.N.	—
10761	8 h.p. 1914 3-sp. Matchless & s.c.	15 0
10763	2½ h.p. 1916 2-speed 2-stroke New Hudson	33 0
10768	3½ h.p. 1910 single-sp. Triumph	20 0
10769	3½ h.p. 1912 F.E. B.S.A.	25 0
10770	6 h.p. 1912 2-sp. Rex & s.c.	25 0
10772	4 h.p. 1915 3-sp. Douglas & s.c.	65 0
10776	3½ h.p. 1911 single-sp. Lincoln-Eik & sidecar	21 0
10779	2½ h.p. single-sp. Wolf	15 0
10782	7-9 h.p. 1916 3-sp. Harley-Davidson and sidecar	100 0
10786	2½ h.p. 1911 single-sp. Hobart	20 0
10787	3½ h.p. 1915 2-sp. Douglas, lady's	52 10
10789	8 h.p. 1914 Humberette	75 0
10794	4-5 h.p. 1911 Zenith-Gradua	42 10
10795	3 h.p. 1914 2-sp. Royal Enfield	42 10
10797	2½ h.p. 1916 2-sp. Galthorpe-Jap	31 10
10800	7-9 h.p. 1915 3-sp. Excelsior	60 0
10802	4½ h.p. 1915 3-sp. model K B.S.A.	52 10
10804	3½ h.p. 1913 3-sp. Triumph & s.c.	37 10
10805	4 h.p. 1911 3-sp. Bradbury & s.c.	37 10
10806	3½ h.p. 1912 3-sp. Triumph	30 0
10808	3½ h.p. 1915 2-sp. Scott and sidecar	67 10
10809	3½ h.p. 1916 3-sp. Sunbeam & s.c.	85 0
10810	4-5 h.p. 1916 countershaft Zenith and sporting sidecar	67 10
10814	3½ h.p. 1916 2-speed Revere	35 0
10816	4½ h.p. 1916 3-sp. B.S.A. and s'car	15 0
10824	3½ h.p. 1913 3-sp. Triumph	37 10
10825	6 h.p. 1916 2-sp. Royal Enfield and sidecar (dynamo lighting)	94 10
10826	2½ h.p. 1916 single-speed Lewis	—
10828	3½ h.p. 1911 2-speed Humber	20 0
10830	1½ h.p. 1916 2-speed Enfield & s.c.	84 0
10831	5-6 h.p. 1915 2-sp. Fafnir and s.c.	32 10
10834	5-6 h.p. 1914 2-sp. A.C. Sociable	40 0
10835	2½ h.p. 1915 3-speed Douglas	40 0
10836	3½ h.p. 1912 f.c. Triumph	22 10
10838	2½ h.p. 1915 2-sp. kick-start model New Imperial	39 0
10839	3½ h.p. 1915 2-sp. New Imperial	25 0
10840	2½ h.p. 1916 3-sp. 2-st. Galthorpe	30 0
10842	6 h.p. 1915 3-sp. A.J.S. com.	90 gns.
10843	4-5 h.p. 1914 Gradua-Zenith and sidecar	—
10846	3½ h.p. 1912 2-speed Ariel	—

—DOUGLAS, 1915, 2½hp, 2-speed, T.T., lamps, horn, speedometer, knee grips, spare belt, spares, etc., £44. Elce and Co., 15-16 Bishopsgate Ave., Camomile St., E.C. 372-860

—DOUGLAS, 5hp, 1914, electric lighting, 2-speed, exchanges, cash offers. 245 Hammersmith Rd., London, W. 372-d907

—DOUGLAS, 1914, 2½, semi-T.T., 2-speed, Stewart speedometer, in good condition, £37 10s. William Betts, Ltd., 96 Upper Richmond Rd., Putney. Phone, 1766 Putney. 372-854

—DOUGLAS, 1911, 2½hp, 2 speeds, almost new, lamps, horn, speedometer, bargain, £45. The Barnes Motor Garage, opposite Red Lion, Barnes, S.W. Phone, 1743 Hammersmith. 372-939

—DOUGLAS, 1914, 2½, 2 speeds, almost as new, lamp, horn, etc., fitted light cane sidecar, complete, very fast machine, £60. The Barnes Motor Garage, opposite Red Lion, Barnes, S.W. Phone, 1743 Hammersmith. 372-938

—DOUGLAS, 1915, 4hp combination, £65, almost new.

—DOUGLAS, 1914, 4hp, 2 speeds, disc wheels, in nice order, £45

—DOUGLAS, 1915, 2½hp, 3 speeds, £46.

—DOUGLAS, 1915, 2½hp, 2 speeds, War Office model, £46.

—DOUGLAS, 1912, 2½hp, 2 speeds, in good order, £23. Percy and Co., 337 Euston Rd., London. 372-908

—DOUGLAS, 1913, 2-speed, clutch model, all accessories, really fine order, £35 10s.; also another similar model, needing slight repairs, £24 10s.; 1911 (date guaranteed), 2½hp, 2-speed, kick-start model, absolutely unscratched, £44 10s.; deferred payments if desired. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. Phones, Walthamstow 169 and Hornsey 1956. 372-866

—DOUGLAS, 1915, 2½hp, W, 3-speed, clutch, engine perfect, ridden very little, nearly new, with accessories, £52 10s. Robinson's Garage, Green St., Cambridge. 372-877

—DOUGLAS, 1914, 2½hp, T.T., 2-speed, new Dunlops, B170 saddle, 2 Lucas lamp sets and horn. Stewart speedometer, excellent condition, £38 10s. Robinson's Garage, Green St., Cambridge. 372-880

—ENFIELD combinations, 90 guineas: 3hp twin, £57 10s.; 2-speed 2-stroke, £45; delivery from stock. Exeter Motor Cycle Co., Ltd., 7 Bath St., Exeter. zzz 335

—ENFIELD, war bargain, 2½hp, 2-speed twin Enfield, tyres as new, take £21, or exchange Dale, 118 Old Rd., Brampton, Chesterfield. 372-d874

—ENFIELD, 3hp, 1917, perfectly new, £50 for quick sale. Field, City Hotel, Bangor. 372-f000

—ENFIELD, 1917, 3hp, 2-speed, kick-starter, 55 guineas. Below.

—ENFIELD 1917 6hp combination, 90 guineas, delivery from stock. D. J. Shepherd and Co., Enfield Highway, N. 372-897

—ENFIELD 1916 6hp combination, hood, screen, 3 lamps, speedometer, mirror, original tyres still on, £85. Lamb's. Below.

—ENFIELD 1916 6hp combination, lamp, horn, new 2 months ago, £85. Lamb's. Below.

—ENFIELD 1916 6hp combination, 3 Lucas lamps, Stewart speedometer, horn, mileage slightly over 1000, £84.

—ENFIELD commercial chassis, with quite new box on, 12 guineas. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. Phones, Walthamstow 169 and Hornsey 1956. 372-871

—ENFIELD, 6hp, 1917, dynamo lighting outfit, with hood and screen, £115 15s.; also 1917 6hp standard combination Enfield, hood and screen, £100; 3hp solo models, T.T., touring, £57 15s.; two 8hp 2-seater combinations, £99 12s.; not "coming in," but actually in stock; good prices offered for second-hand up-to-date machines in part exchange; deferred terms if desired. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. Telephones, Walthamstow 169 and Hornsey 1956. Trade 372-868

—ENFIELD combinations. One 1916, mileage 450, 3 lamps, cost £110, 11 guineas; one 1915 combination, Lucas accessories, mileage 5000, perfect, 55 guineas; one 1913 coach-built combination, fully equipped, good order, 41 guineas. Phone 5392. Troward, 11 High St., Hampstead. 372-887

—EXCELSIOR (American), 7-9hp, twin, 3 speeds, brand new, latest models, magneto or dynamo, fully equipped, splendid finish, limited quantity only, immediate delivery. Myers, 89 Gt. Portland St., London, W. Phone, Mayfair 4503. 372-873

—F.M., 4-cylinder, magneto, dropped frame, runs well, sacrifice £12 15s. 1 Ebner St., Wandsworth. 372-1876

—GIVAUDAN, 3½hp, A.M.A.C., good tyres, belt, bargain, £4. 152 Camberwell Grove, London. 372-1878

—HARLEY-DAVIDSON, late 1915 combination, fully equipped, excellent condition, £80; cash or easy terms. R. E. Jones (Garages), Ltd., Swansea. zzz-31

—HARLEY-DAVIDSON combination, 7-9hp, 1915, speedometer, accessories, perfect, offers. X., 64 Wellgate, Rotherham. 372-d818

—HARLEY-DAVIDSON 1916 combination, indisputable from new, run 600 miles, a bargain, £20. Percy and Co., 337 Euston Rd., London. 372-922

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—HARLEY-DAVIDSON 1916 models delivered from stock on the best terms for cash, exchange or easy payments; sidecars in stock to fit. Below.

—HARLEY-DAVIDSON, 1915, 7-9hp, 3 speeds, accessories, £50. Below.

—HARLEY-DAVIDSON, 1915, 7-9hp, 3 speeds, Model 11J, electric lighting, electric horn, with Harley sidecar, Model A, £63. Elce and Co., 15-16 Bishopsgate Avenue, Camomile St., E.C. 372-858

—HARLEY-DAVIDSON 1915 combination, m.p.g., dynamo electric lighting, Stewart's speedometer and horn, excellent condition, owner leaving for Front, £70. Wallace, 11 Eton Avenue, London, N.W. 372-d358

—HAZLEWOOD, 1914, 6hp twin J.A.P., 3 speeds, countershaft, coach-built sidecar, speedometer, a bargain, £32. Percy and Co., 337 Euston Rd., London. 372-920

—HENDERSON, 1914, 10hp, 4-cylinder, 2-speed, with sporting Canoelet sidecar, all accessories, first-class condition. Darbey, Three Crowns Inn, Dudley. 372-851

—HUMBER, 1914, 3½hp, 3-speed, lamp, etc., £35. R. E. Jones (Garages), Ltd., Swansea. zzz-31

—HUMBER, 1915, 3½hp, 3-speed, nearly new, special price, £57 10s. Exeter Motor Cycle Co., Ltd., 7 Bath St., Exeter. zzz-336

—HUMBER. To dealers wanting a 1917 machine, absolutely unscratched, 4hp, horizontal twin Humber, not ridden, take £71, or Morgan considered. Tom Dale, 118 Old Rd., Brampton, Chesterfield. 372-d872

—HUMBER, 1917, 3½hp, horizontally-opposed twin and T.T. touring models, delivery from stock, £75. Wilkin and Co., Hunter's Bar, Sheffield. 372-d896

—HUMBER, 1917, 6hp, horizontally-opposed water-cooled twin, £89 5s. Wilkin and Co., Hunter's Bar, Sheffield. 372-d895

—HUMBER, 1917, 3½hp, twin horizontal engine, semi-T.T. bars, handlebar-controlled clutch, quite new, just delivered, £75; with Mills-Fulford coach sidecar, complete, £88; Douglas machine taken in part exchange. Robinson's Garage, Green St., Cambridge. 372-278

—IMPERIAL J.A.P., 1915, 2½, 2-speed, as new, £29. William Betts, Ltd., 96 Upper Richmond Rd., Putney. Phone, 1766 Putney. 372-855

—INDIAN, 7hp, 1914, sidecar, £55. Letters, Wade, H.A.C., Cedars, Belmont Hill, Lewisham. 373-d781

—INDIAN, 7-9, T.T. model, spring frame, ridden very little, tyres as new, electric horn, light off dry battery, very fast, 2-speed and clutch, owner ordered to give up motoring, must sell, £35 lowest, absolute sacrifice. S. Serpell, South St., Reading. 372-d913

—INDIAN, 1914, 2-speed and clutch, spring frame, Indian electric lighting and horn, 25-guinea Swan sidecar, new tyre on back wheel, just been overhauled, trial by appointment, £52. Beresford, Cavendish Cottage, 118 Old Rd., Brampton, Chesterfield. 372-d873

—INDIAN, late 1915, 7-9hp, spring frame, 20-guinea sidecar, electric lighting, speedometer, spares, ridden 2000 miles, perfect condition, what offers? Howroyd, 5 Clarence St., Bradford. 372-d859

—INDIAN, 1915, 7-9, in splendid order, complete with wicker sidecar and accessories, £50. S. Harris, 41 Ash Rd., Stratford. 373-d884

—INDIAN 1916 Powerplus combination, run 315 miles, cost £120, accept £90.

—INDIAN, 1915, 7-9hp, T.T., almost new, £46.

—INDIAN, 1915, 5hp, 3 speeds, Swan sidecar, practically as new, £55.

—INDIAN, 1915, 3½hp, twin, 3 speeds, as new, £42.

—INDIAN, 1914, 3½hp, 2 speeds, as new, £26. Percy and Co., 337 Euston Rd., London. 372-921

—INVICTA, 1916, 2½hp, 2-speed, absolutely as new, £33. Wilkin and Co., Hunter's Bar, Sheffield. 372-d901

—IVY, 2½, 2-speed, 2-stroke, 1915, perfect, 11 guineas. Troward, 78 High St., Hampstead. 372-891

—JAMES 1914 4½ combination, exceptional condition throughout, lamps, horn, speedometer, 50 guineas, genuine bargain. York Hotel, Sandown, I.O.W. 372-d918

—KERRY-ABINGDON 5hp twin, 3-speed gear, etc., perfect order and fully equipped, complete with Mills-Fulford coachbuilt sidecar, £35, bargain. Smith, 199b King St., Hammersmith. 372-d909

—LEVIS 2-stroke motorcycles, latest 1916 models. Sole London and district agents, Cars and Motor Sundries, Ltd., 175-177 Shaftesbury Ave., London, W.C. Phone, 1432 Regent. zzz-818

—LEVIS, 1916, 2½, 2-speed, cost £47 10s., run 400 miles, practically new, £33, owner serving. Burt, 155a Church Rd., Hove. 373-d718

—LEVISES, 1917 Popular and model E, delivery from stock. Wilkin and Co., Hunter's Bar, Sheffield. 373-d899

—LEVIS, 1916, 2½hp, model E, chain drive, condition as new, £36. Wilkin and Co., Hunter's Bar, Sheffield. 373-d899

—LEVIS, Baby model, perfect condition throughout, 20 guineas. 245 Hammersmith Rd., London, W. 372-d900

TO OUR CUSTOMERS.

208, Great Portland Street, London, W.
26th December, 1916.

We think we cannot do better than to utilize our space this, the last week of the Old Year, in thanking our customers for their support during the past Season.

In all our advertisements we have aimed at originality. Sometimes we think we have succeeded in being humorous. We have even, like Silas Wegg, occasionally "dropped into poetry," but we have never lost sight of two most important facts, viz.:—that the reputation of a Firm depends upon the way it treats its customers, and that the most valuable advertisements are the recommendations of satisfied customers.

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To all our friends, then, our hearty thanks and our best wishes for the coming Year.

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—LEVIS, 1916 model, 2½, magneto, 2 speeds countershaft, i.e., splendid condition, little used, cost £47 10s., only £33 10s. Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 372-1877

—LEVIS Populars, 3 in stock, £32. D. J. Shepherd and Co., Enfield Highway, N. 372-900

—LEVIS, 1915, 11 guineas. Troward, 78 High St., Hampstead. 372-889

—MATCHLESS, 1914-15, 7hp M.A.G. engine, 8B combination, acetylene lamps, new 3 in. tyres front and back, perfect condition, £70. Box No. 9203, c/o "Motor Cycling." 378-c605

—MATCHLESS 1914 coach combination, accessories, 2000 miles, ridden carefully, £65. A. Mansfield, R.N. College, Greenwich. 372-d853

—MATCHLESS combination, 2-speed, clutch, kick-start, late 1913, perfect, fast and flexible, 35 guineas. Troward, 78 High St., Hampstead. 372-888

—MINERVA, 4-5hp, twin-cylinder, in good condition, magneto, good tyres, £12 10s. J.C., 13 Cambrian Grove, Gravesend, Kent. 372-d892

—NEW HUDSON, 2½hp, 2-speed, 2-stroke, £38. Exeter Motor Cycle Co., Ltd., 7 Bath St., Exeter. zzz-337

—NEW HUDSON 4hp combination, £92 8s., delivery from stock. Below.

—NEW HUDSON, 2-stroke, Model C, 3 in stock, £38. D. J. Shepherd and Co., Enfield Highway, N. 372-901

—NEW IMPERIAL, 8hp J.A.P., 2 speeds, 1914, in real good order, £26. Percy and Co., 337 Euston Rd., London. 372-916

—NORTON, 1916, "Big 4" combination, scarcely used, complete with lamps, horn, and speedometer, £85. Wilkin and Co., Hunter's Bar, Sheffield. 372-d897

—NORTON, 1915, "Big 4" combination, hood and green, lamp, and horn, etc., £270. Wilkin and Co., Hunter's Bar, Sheffield. 372-d898

—NORTON 1917 combination, brand new, the big four, actually in stock, £90. Percy and Co., 337 Euston Rd., London. 372-919

—N.S.U., 1912, 2½hp, twin, 2 speeds, in good order, £28. Percy and Co., 337 Euston Rd., London. 372-910

—O.K., 1916, 2-speed, with original tyres, accessories, £29 10s.; deferred terms if desired. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. 372-872

—P. and M., 1912, 3½hp, and sidocar, lamps, horn and speedometer, £33. Wilkin and Co., Hunter's Bar, Sheffield. 372-d902

—P. and M., 1913, 3½hp, coach-built combination, £40. Tuke and Bell, Ltd., Motor Dept., Carlton Engineering Works, High Rd., Tottenham, N. 382-525

—P. and M., late 1914, 3½hp, 2-speed, with P. and M. coach sidocar, splendid order, £55; exchanges, deferred terms if desired. Lamb's, 151 High St., Walthamstow, and 50 High Rd., Wood Green. 372-869

—PRECISION, 1913, 2½hp, Dunlop tyres and belt, Senspray carburettor, long exhaust, very fast, perfect, £17. D. J. Shepherd and Co., Enfield Highway, N. 372-102

—PREMIER, 1914, 3½hp, 2 speeds, coach-built sidocar, £45, cash or easy terms. R. E. Jones (Garages), Ltd., Swansea. zzz-117

—PREMIER, 1914, 3½hp, 3-speed countershaft gear, with all-cane sidocar with panniers, tyres new, speedometer, lamps, and all sundries, £38. Freeth, 5 Cornwall Parade, Church End, Finchley. 372-d821

—PREMIER, 1914, 3½, 2-speed countershaft, 27 guineas. Troward, 78 High St., Hampstead. 372-894

—QUADRANT, 1914, 3-speed, perfect, 29 guineas. Troward, 78 High St., Hampstead. 372-892

—REX 1913 6hp combination, 2-speed, free engine, handle starter, new Dunlop tyres, Bosch B and B, and coach-built sidocar, not used for 18 months, £20, no offers. 1 Boswell St., Radford, Nottingham. 372-d893

—REX, 1912, 4, Bosch, dropped frame, good tyres, quick sale, £14 10s. Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 372-1878

—ROVER combination, 3-speed, late 1911, almost as new, Watford and watch, Lucas lamps and horn, spring seat pillar, also spare cover, 11 guineas, seen by appointment. E. Ward, 17 Clements Rd., East Ham, Essex. 372-d920

—ROVER, 1917, 3½hp, 3-speed, actually in stock, £69 10s. Wilkin and Co., Hunter's Bar, Sheffield. 372-d904

—ROVER, 1916, 3½hp, T.T., with Philipson pulley, lamps, bulb horn, mechanical horn, guaranteed absolutely as new, done under 100 miles, bargain, £50. Below.

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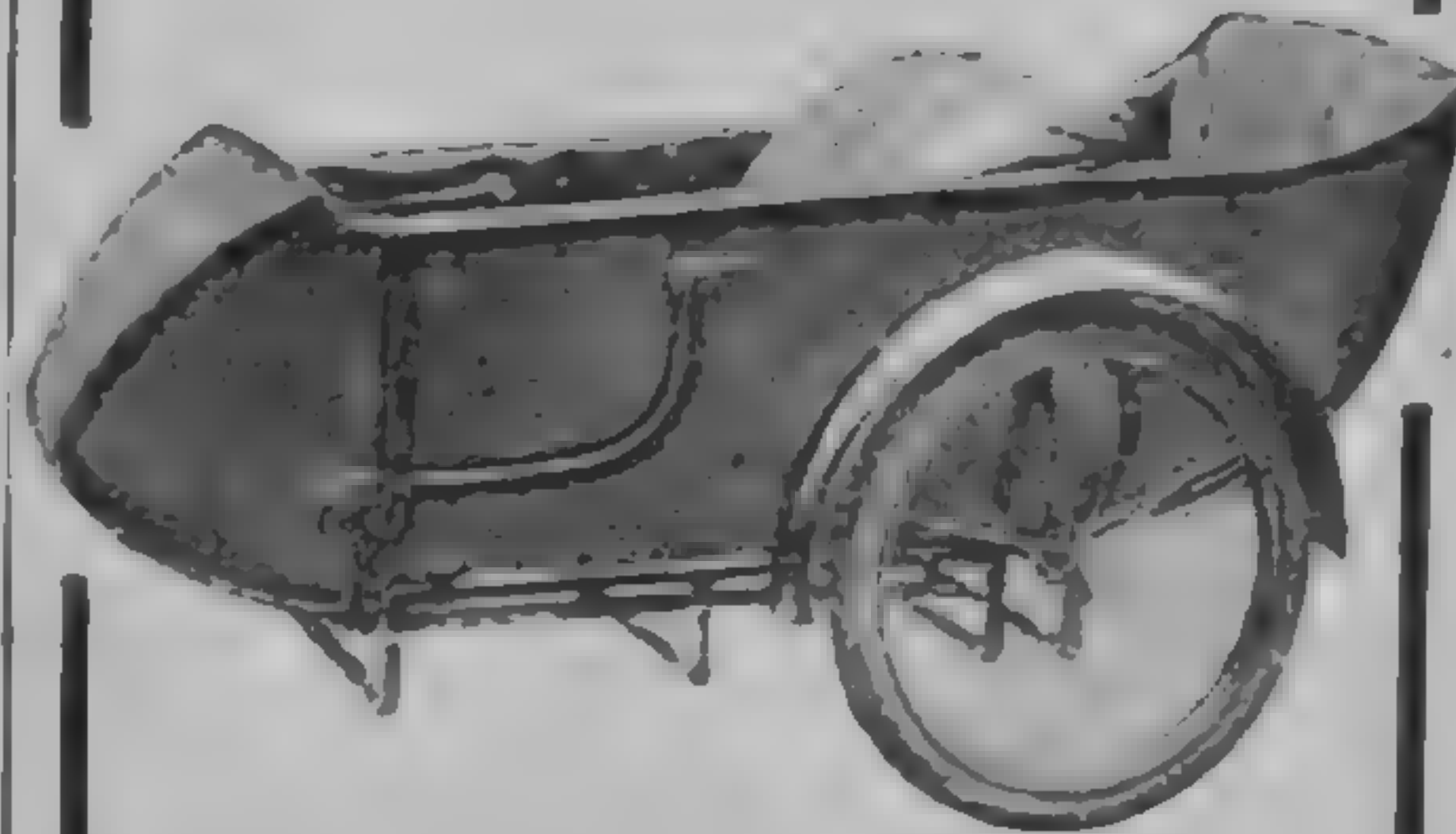
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Under the above regulation, advertisements offering situations with firms whose works are situated within 30 miles of London and whose business consists wholly or mainly in engineering, shipbuilding, or the production of munitions of war, or of substances required for the production thereof, must contain the words—"NO PERSON ENGAGED ON GOVERNMENT WORK OR RESIDENT MORE THAN 10 MILES DISTANT NEED APPLY."

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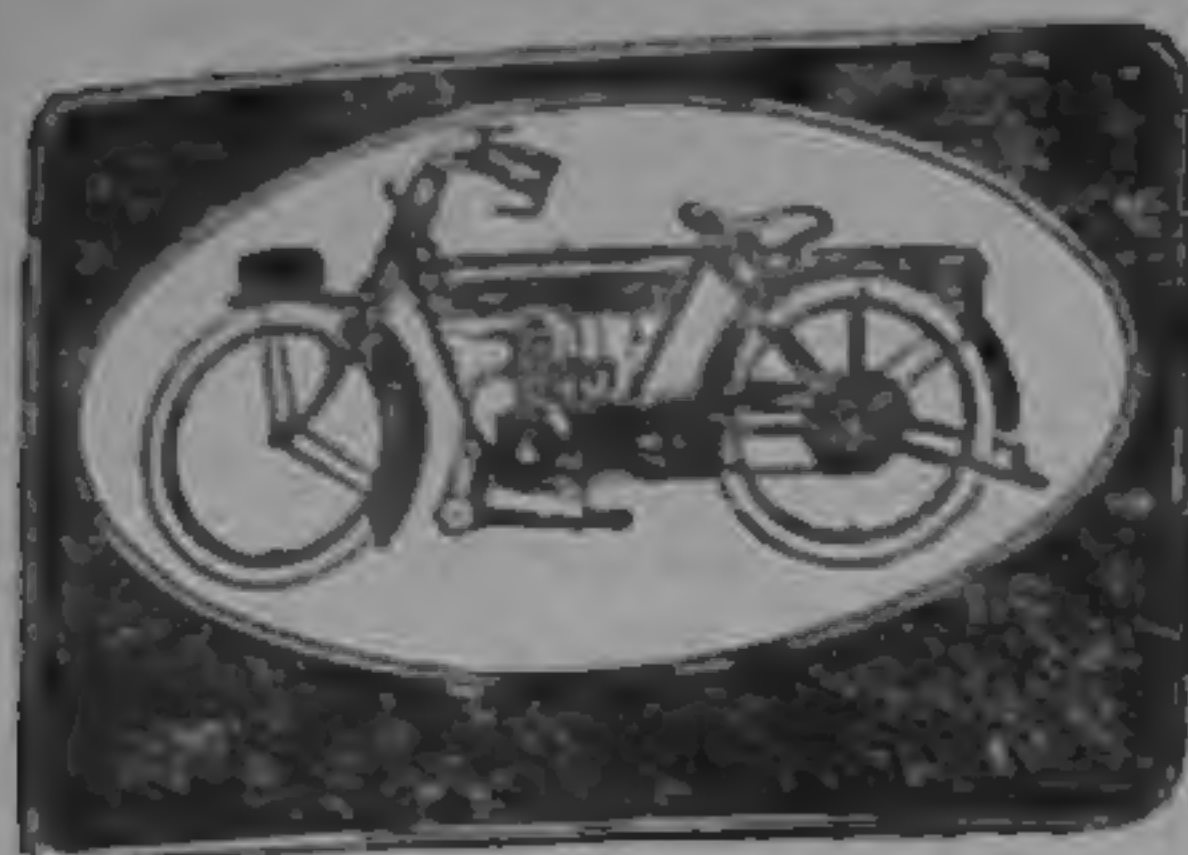
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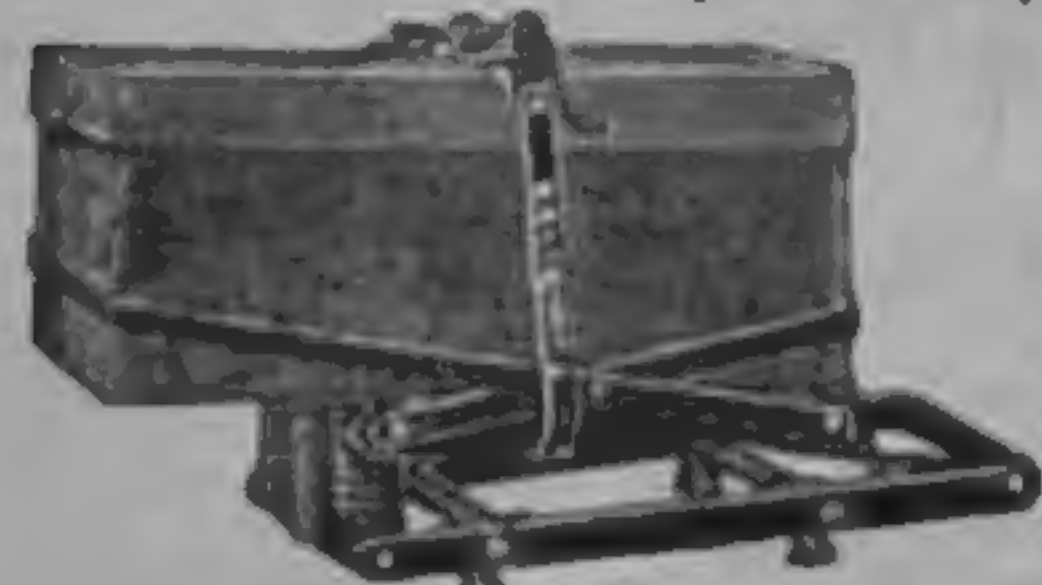
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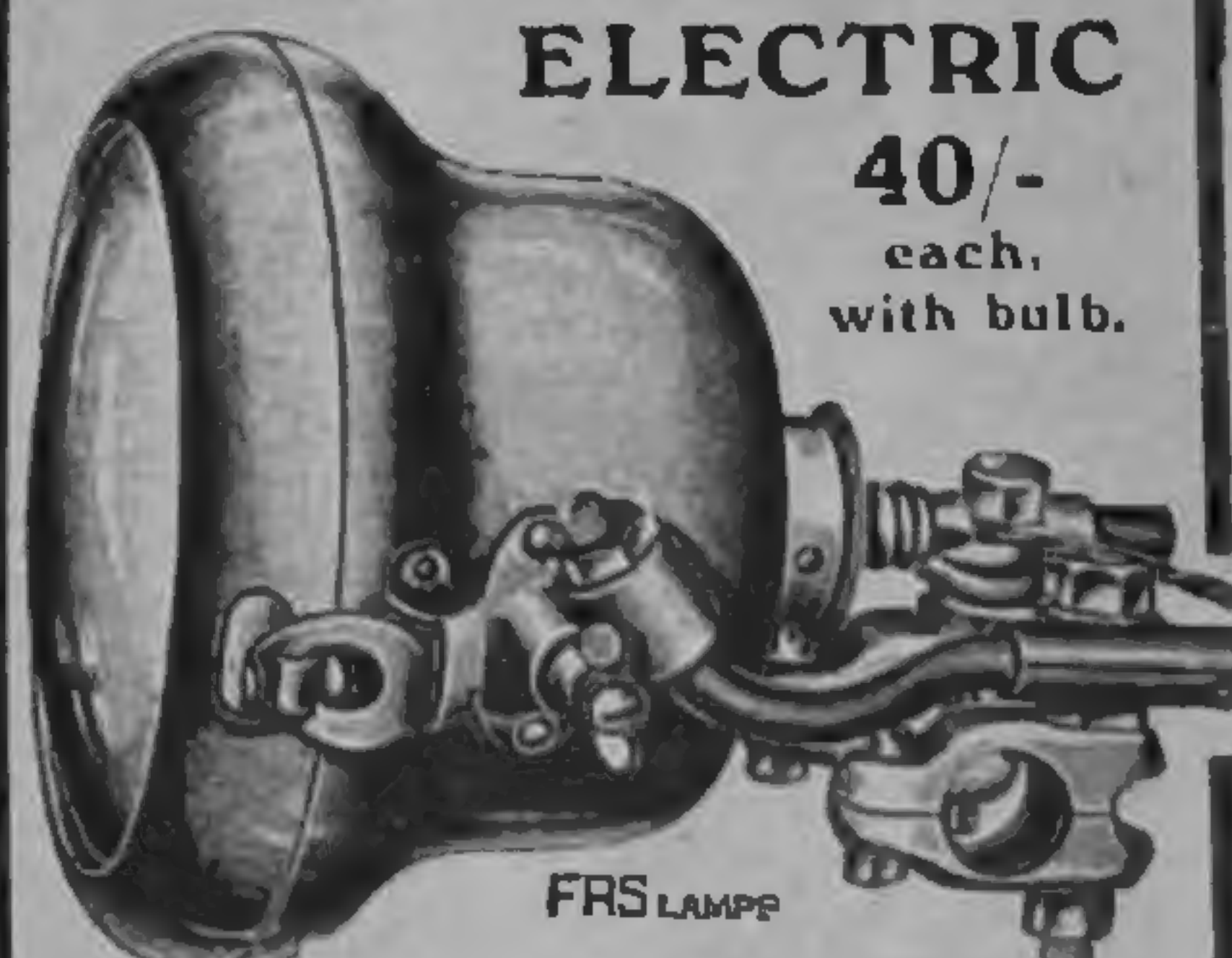
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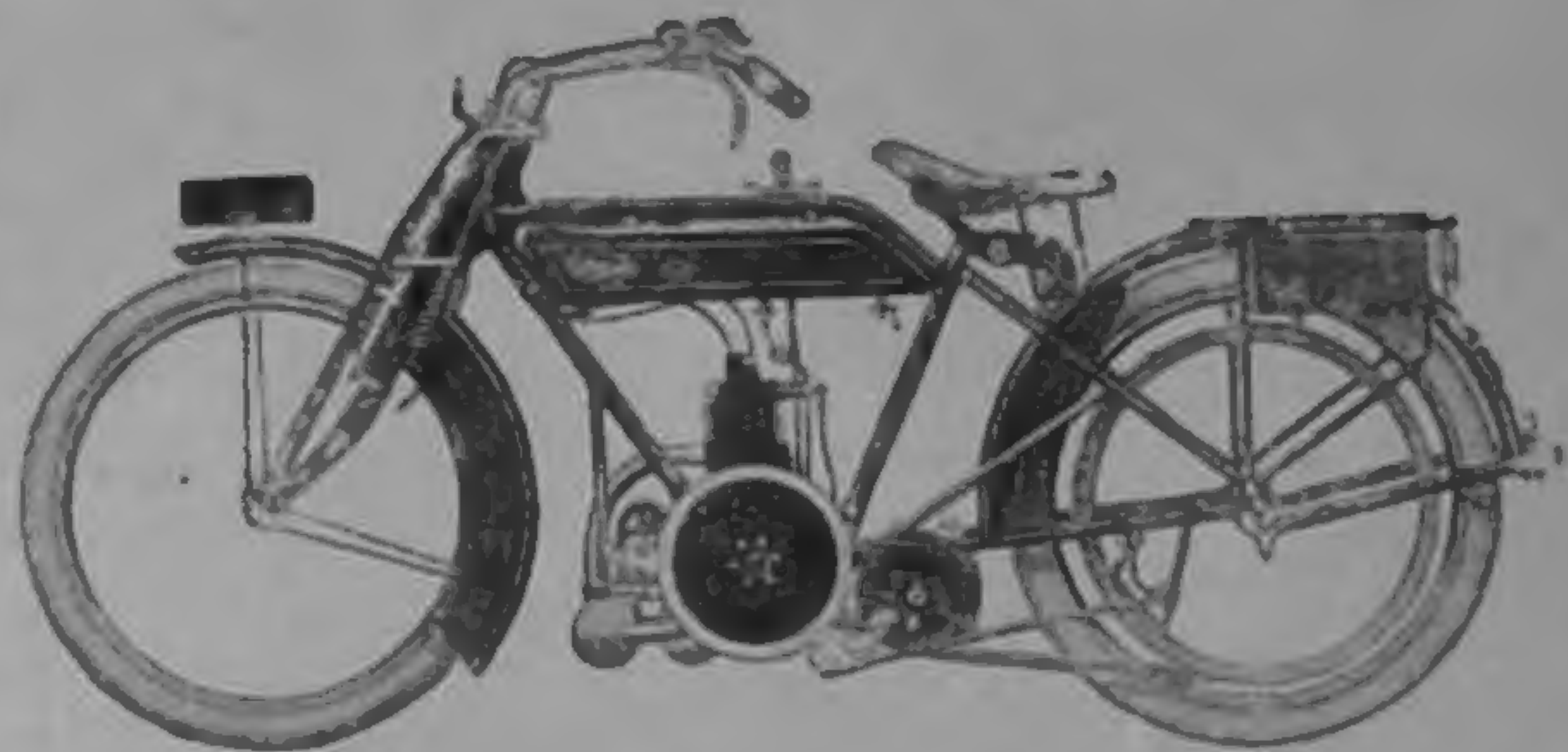
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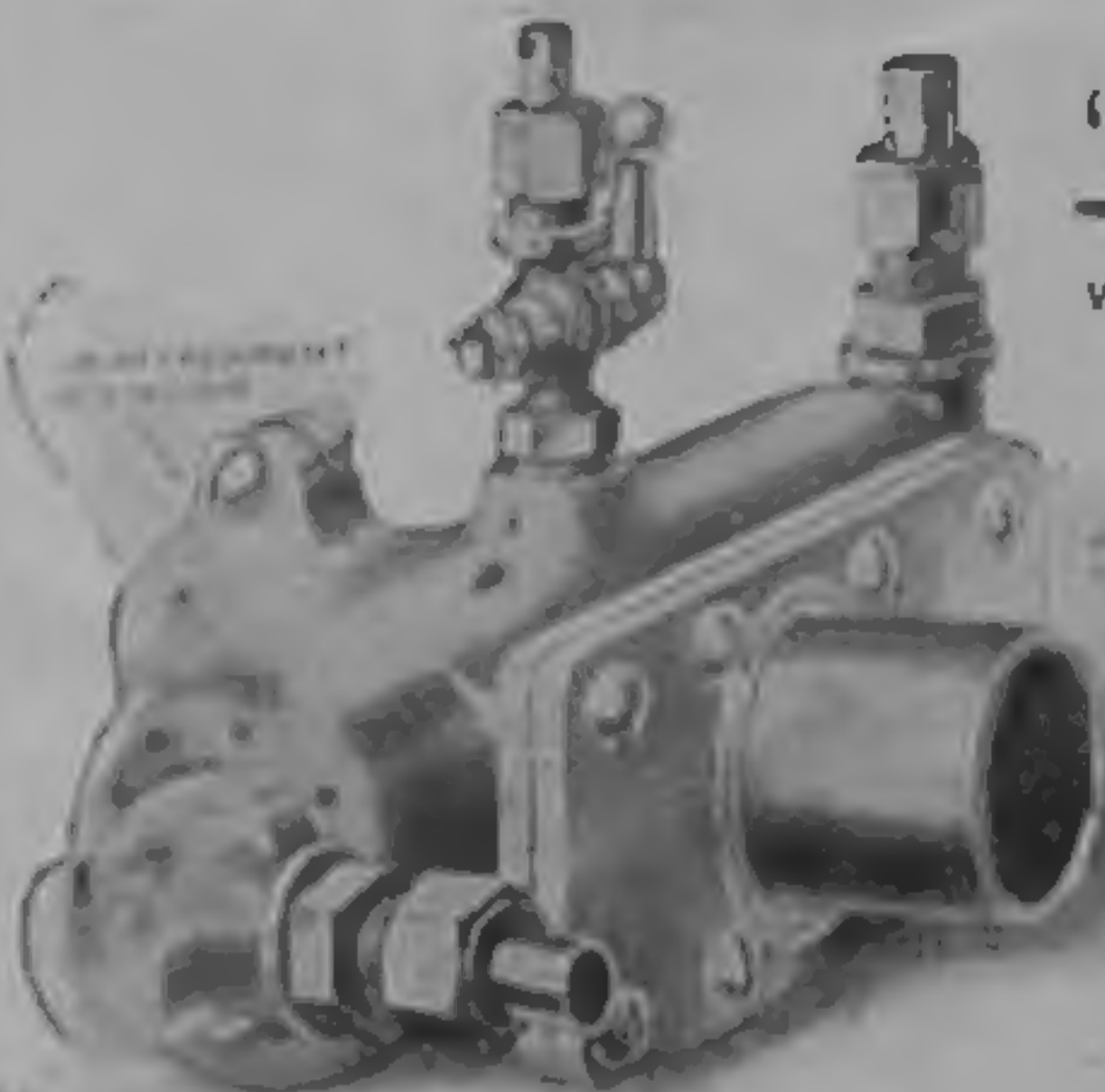
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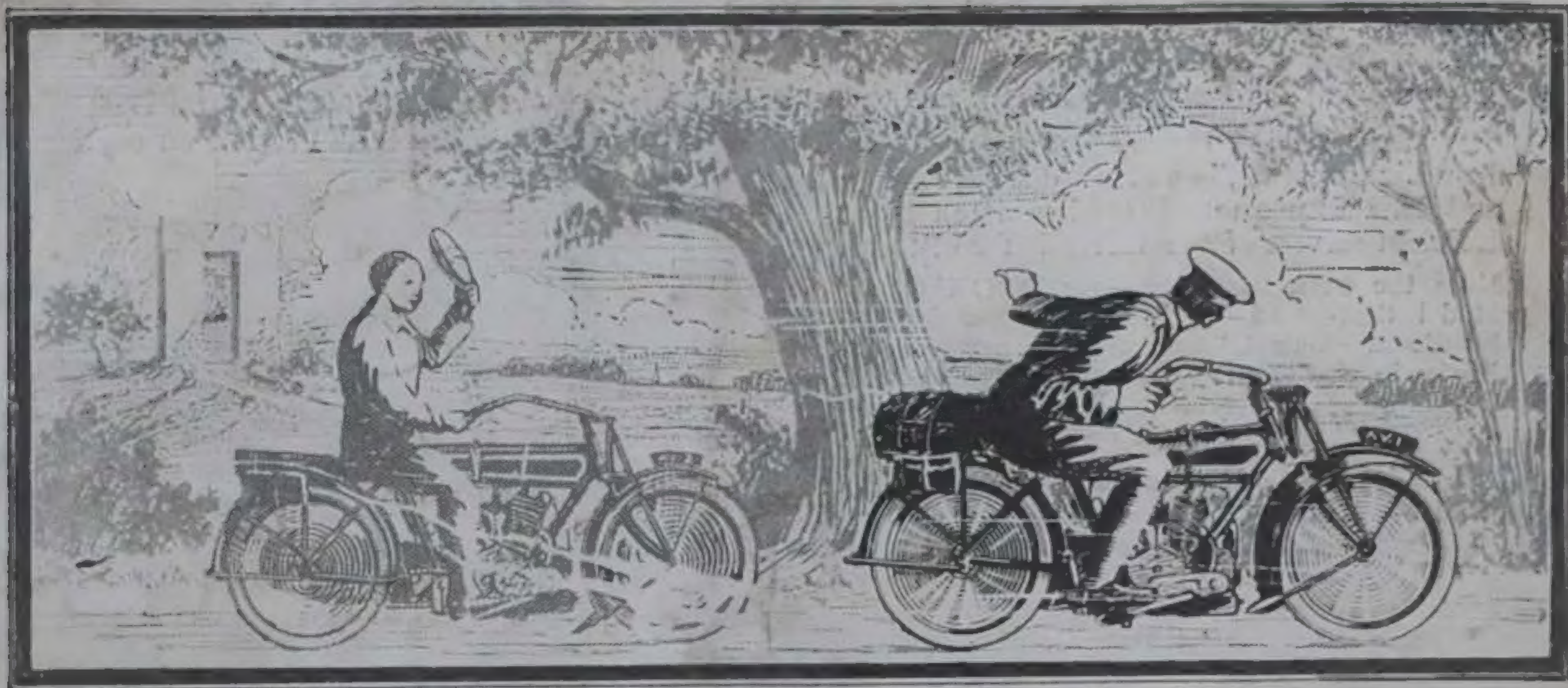
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